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Principal Contents:

	PAGE
To-day's Meeting	73
Commercial Cooking and Baking. By W. Easton	75
Immunity from Shock. By S. H. Parsonage	78
Maintaining Water Level. By Vernon Walker	78
System Connections. By W. T. Taylor	80
Electric Cooking in Hospital Kitchens	81
Lubricating Clay Dies Electrically	81
A Coal-cleaning Installation	82
Rugby Revisited	83
The Battersea Gas-washing Plant	84
Electricity in Woodworking	85
Electric Colliery Winders	85
A Hospital Lift Installation	86
Correspondence: The R. H. Tree Testimonial Fund; Electricity in Fencing; Costing Bulk Supplies; Earthing—Solid or Artificial? Trade or Technics?	87
The Benson Boiler	88
New Apparatus and Devices	89
In the Courts	92
Parliamentary News	92
Business and Industrial Notes	93
Electricity Supply	97
Traction	100
Communications	100
Contract Information	101
Notes	102
Our Personal Column	103
New Companies Registered	104
Returns of Electrical Companies	105
City Notes	105
Stocks and Shares	105
Published Specifications	107
New Work for Contractors	108

To-day's Meeting

TO-DAY the extraordinary general meeting summoned to pass resolutions necessary for effecting the reconstruction, already decided upon, of the Electrical Development Association is being held.

We will not waste words describing again the scheme that has been adopted—we will take it for granted that everybody who has a vote is fully acquainted with the scheme set forth in the ELECTRICAL REVIEW of June 9th (p. 819) and with what transpired at the meetings which preceded the scheme. We will further presume that the views expressed in the articles published in these pages during the past few weeks have been carefully read.

The time for discussing the need for reorganisation is past; to-day it is our duty to reach decisions which will enable a reconstituted Association to appoint its Council and get down to work.

We are to go forward led by a body consisting entirely of electrical supply interests. They will furnish the funds for efforts of great variety to be made to develop the sale of electricity; such operations will be conducted on a much larger scale than hitherto. Undertakings alone will be admitted to membership, and we hope that this fact will bring both a large accession to the number of members and a far more substantial contribution to the funds from those already subscribing. One of the first things to be done is to prepare the way for this; so we may expect to-day's proceedings to be devoted to the fundamental point of membership qualification. We hope that the meeting will be marked by a readiness of undertakings to shoulder such financial responsibility as may be urged upon them. In this connection they cannot fail to be encouraged by the large support of the same kind that will come from the Central Board.

Some members will attend knowing that their councils or their directors are prepared to contribute as required. Others will go back to their authorities to advise them that, in order to continue their membership, they will be required to contribute on a definite basis by a specified date. We trust that there will also be a greater readiness of present non-members, both municipal and company, to throw in their lot generously and enthusiastically, so that we may speedily find the organisation possessed of such an income adequate for urgent needs.

The electricity supply authorities have to make up for the loss of income from manufacturers, contractors and wholesalers, but they will require to do far more than this if hopes for the future are to be realised.

The disappearance of the manufacturers' contributions from future revenue accounts will not mean lack of co-operation of this important part of the industry. Anybody who has followed the sectional proceedings of E.D.A. knows that the expert assistance of the manufacturers' representatives in such matters as cooking, water heating, and so forth, has been of great value. The Standing Co-operative Committee leaves the way open for this help to be continued.

It is important that all supply interests should give the strongest possible backing to the measures which will place them in a position of unquestionable authority to control their own organisation and carry the movement forward to complete success.

One thing appears to be certain. There can be no early intensive campaign without adequate funds. That is why we hope that there will be both unanimity and enthusiasm at the Savoy Hotel this afternoon.

Toward American Recovery

OUR electrical contemporaries in the United States which record from week to week the efforts that are being made to lift industry out of the trough of depression afford interesting if somewhat meagre reading just now. The rise in prices leads one editor to remark that there is a point "perhaps already reached" when the consumer market—retail trading—rejects purchasing when the price rise advances out of proportion to the consumer-buying power. In the same direction we

read the report of a decision by the Westinghouse Electric and Manufacturing Company to increase rates of pay to all employés "conforming to the effort of the Government to raise the purchasing power of those dependent upon industry for their income." Further, there is to be a three-day conference of 300 officials of the General Electric Company, Inc., from all of the forty-eight States to formulate plans for "immediately tying in" with the National Recovery Act recently passed by Congress. The decision to hold this conference (starting on August 7) is based upon the fact that the purposes of the Act are to establish a rising spiral of employment, sales and purchasing power, and upon the need for immediate action "to start this spiral working with workers." The public works programme of President Roosevelt is the subject of close consideration by the electrical manufacturing industry, which is preparing a code to form the basis for action. The programme, according to the *Electrical World* of July 8, was slow in developing; no action had been taken by the board on Federal projects (between $300 and $400 million) recommended by Government departments and agencies. There appears to be a disposition to slow down disbursements for public works in view of the increase in industrial activities and prices.

Commercial Cooking

THE widespread use of electrically driven mixers provides sufficient evidence of the growing recognition in the catering trades of the value of the cleanliness and convenience that is possible with the use of electric power. But the returns from such applications is trifling compared with that obtainable from the provision of heat for commercial cooking and baking. Mr. W. Easton, who contributes a practical article on the subject in this issue, refers to the work now being done by Manchester Corporation, which has six large public kitchens connected to its mains (the 300-kW. equipment in which is probably unique in Great Britain so far), as well as several smaller installations and baking ovens, and also nearly 12,000 domestic ovens; new connections average 150 per month. That a satisfied consumer is the best advertisement is evidenced by the influence on developments of the management of the Waldorf City Hotel, which installed the first large electric kitchen in Manchester and has welcomed visits from interested persons.

Come Out into the Open!

IN our opinion, the new Council of E.D.A., when it is set up, should decide to clear out of Savoy Street at the earliest possible moment. A back-street office existence should give way to a fine front on the street level in some important thoroughfare where the throng of human traffic is for ever passing. A magnificent showroom containing impressive exhibits of electrical illumination and a hundred domestic and other applications would be a fine advertisement. The Metropolitan area has its millions who would be impressed by the fact that electricity had a headquarters where all kinds of things electrical could be seen at work and any kind of electrical information obtained. And who is to say that live demonstrations would not ginger up the staff in the offices above and behind if they ever needed it? The idea is well worth thinking about.

Our Changing Industry

IT may seem strange in what is often called the age of specialisation to find a growing number of manufacturers turning to diversity as a means of salvation. And yet those manufacturers of heavy plant who were fortunate enough to have a number of small "side lines" have had reason to be thankful, for their profits have not been so badly diminished as those of the concerns which had no such stand-bys. A good example of the whole-hearted way in which our leading electrical manufacturers are adapting themselves to the new conditions is described in this issue. The British Thomson-Houston Co. has already made a name for itself in the lamp and radio valve business, but now it is producing in bulk refrigerators, cookers, immersion heaters and washing machines, not as a side line but as an important section of its business. It is still, however, manufacturing the heavier equipment with which its name is associated. A large domestic demand is being anticipated by those manufacturers who have adopted these lines of production, and we and they look to the reorganised E.D.A. to so stimulate this demand as to create a ready and rapid market.

Free Water-heating Installations

COMPLAINT was made by the president of the E.C.A. at the Association's recent conference that supply undertakings were disposing of appliances at unremunerative prices as a means of selling more electricity. The Hydro-Electric Power Commission of Ontario goes farther than this. It is a long time since we reported that the Commission was giving fires away to its customers, and now we learn that it is carrying out water-heating installations at no cost to the consumer. The idea is to build up the water-heating load to dispose of the excess energy which is available. The cost of an installation, which is only provided where there is an existing hot-water tank, is from £4 to £4 10s. It is stated that the cost of the installation is recovered in a year. The installations are thermostatically controlled, and boosters can be fitted, payment for these being spread over five years. It undoubtedly pays the Commission to do this. Electricity is not like gas which is made and stored. The generators have to be kept running, and unless they are properly loaded they are not earning their full revenue; the extra running costs due to additional load are but a small proportion of the revenue which that load brings.

Too Little Light

LIGHTING was the first application of electricity supplied from the public mains; it is still the most popular. Yet there is a possibility that its importance may be overlooked in the development of newer loads that present greater possibilities in energy consumption. We are still far below a reasonable standard in our hotels, houses, and schools. A correspondent informs us that every time he returns to England from Buenos Aires he is struck with the poor illumination intensities accepted in this country as compared with those usual in Argentina. He believes defective eyesight due to eyestrain to be far more prevalent here, and suggests that a national campaign to improve indoor lighting would provide a handsome return on outlay. We could refer him to the work of the Lighting Service Bureau in pointing the way, both at Savoy Hill and in the provinces, by its travelling showroom. But it is also necessary that every member of the electrical industry shall be convinced (and shall pass on his conviction) that we cannot, practically speaking, have too much light if it is properly applied.

For His Stomach's Sake

WHAT a long way we electrical people have to go before the general public will understand some of the most elementary facts regarding electricity! Pages could be filled with examples of ignorance which we fear must be regarded as excusable and for which we are largely to blame. Sometimes this want of knowledge is extremely amusing. Let us quote a recent case. In an E.D.A. broadcast from Radio Paris reference was made to "electric hot water." One of the customers of an electricity undertaking in England, who listened-in to the talk, was sufficiently interested to write to E.D.A. for information, and the undertaking was duly advised and got into touch with the inquirer. Its representative surprised him by discussing "electric water heating"; he had thought when listening-in that in the production of electric hot water you "put something into the water for health reasons"!

Commercial Cooking and Baking. By W. Easton, B.Sc. A.M.I.E.E.

Some notes based on actual experience in Manchester

THE slow development of electric cooking and baking is probably due to the wide variety of conditions in the catering trades and to the difficulty of proving direct monetary gains over existing methods.

Mr. W. Easton is power sales engineering assistant in the Manchester Corporation Electricity Department

Public taste varies from district to district, and the strict individualism of the catering trades, which arises from the necessity of serving customers with what they want, makes wide generalisations as to the methods of food preparation inadmissible; hence each prospective user of electricity for cooking needs expert advice and assistance as to the types and sizes of apparatus best suited to his purpose.

The caterer cannot put off until to-morrow what he has failed to do to-day, and it is not surprising that traditional methods are retained on the grounds of their proved reliability in spite of the superiority of new ideas. Supply interruptions on urban networks are, however, now uncommon, and provided that attention is paid to the installation work there is little reason in the argument that electricity is not sufficiently reliable for the chef or baker to make himself solely dependent on it.

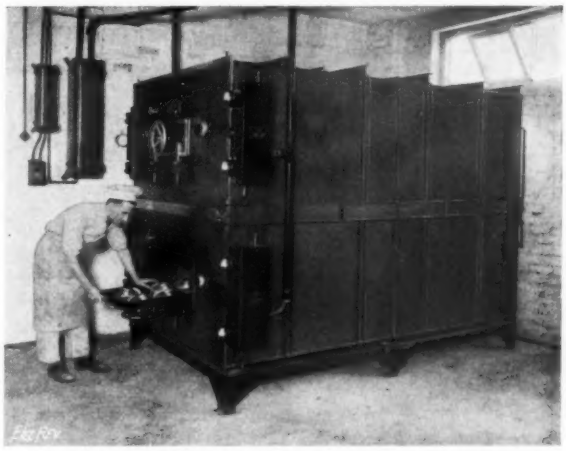
The " Manchester Guardian " staff restaurant servery showing electrically heated chip box and hot cupboards

A number of new types of baking oven have been introduced in recent years, but these are chiefly designed for special purposes. The bulk of the wholesale bread trade has passed into the hands of bakers employing electrically driven oil-fired conveyor ovens, and such ovens, if properly designed, operate at a cost which does not admit of direct competition by electric heat except in unusual circumstances. On the other hand, power-driven biscuit ovens are well adapted to the use of electricity, particularly if thermostatic control is employed. Peel ovens still retain their popularity and are almost universally used by the retail bakers and confectioners who handle the bulk of the baking business. Such bakers produce a wide variety of goods, and hence require ovens which are capable of operating over the complete range of baking temperatures, that is, from 550 deg. to 200 deg. F. and under.

Such conditions impose a severe test on an oven, as the temperature should not be depressed below the level proper to the class of goods when a cold charge is inserted. Stability is usually obtained in fuel fired ovens by the incorporation of brickwork in the structure to form a reservoir of heat for levelling out inequalities during charging periods, but this renders it difficult to drop the temperature to lower levels when lighter goods have to be baked. In heavy ovens various expedients, such as drawing fires and opening doors and dampers, are adopted; if these prove insufficient the baking is sometimes carried out on inverted tins to minimise the heat from the sole. The baking operations are therefore controlled by the oven temperatures and much valuable time is lost.

Where Electricity Scores

The unique feature of the electric oven of heating the baking



A G.E.C. double-deck oven (4 ft. by 8 ft.) in a Manchester bakery

chamber from within largely overcomes these difficulties, and a wide range of temperatures can be obtained without sacrifice of solidity, the response of the oven being immediate on the turning of the switch. The output of the electric oven is, therefore, greater than that of the fuel-fired oven of corresponding size.

The operating cost of the electric oven depends to a large extent on the class of goods turned out. If bread baking predominates the consumption will be greater than that of an oven of equal size which is chiefly engaged in confectionery work. Tests recently carried out in a good class business where a double deck 4 ft.×4 ft. oven is installed gave the cost of baking per £ value of goods sold as 4d. for pastry and 5d. for bread, with electricity at 0.75d. per kWh. Uniformity of baking is an outstanding characteristic of the electric oven, as the even disposition of the heating elements prevents local overheating and the goods need not be turned in the course of baking.

Almost invariably the first question asked by a baker who is considering the purchase of electric ovens is designed to elicit a statement of running cost. Owing to the difficulty of obtaining comparable figures when conditions vary so much it is rarely possible to give a direct answer. Usually it is better to introduce the inquirer to a user of electric ovens, who is more able than the engineer to discuss the matter in the language of the trade, and to allay doubts by recounting his own experience. The taking

Fish-frying range at the Waldorf City Hotel

of weekly meter readings by the baker is of the greatest value in keeping costs down by preventing the accumulation of little extravagances in the use of energy.

Electricity cannot be expected to compete with raw fuel directly, but elimination of flue cleaning and charges for the repair of grates and furnace crowns, the greater available space in the bakehouse, superior baking with little attention to the oven, absence of fumes and high temperatures, and for the working baker exemption from the necessity of attending

Test meters at the Piccadilly Hotel, Manchester

to the oven on Sundays are to be weighed against the few extra shillings a week which the electric oven may entail.

The Choice of Equipment

The field for heavy duty electric cooking equipment may be divided into three broad classes :—hotels and restaurants; canteens; and institutions. The requirements of the three classes are markedly different. Restaurants carry out the bulk of the cooking towards midday with some evening load, the institution starts operations early in the morning, and the canteen kitchen is generally closed down when lunches have been served. The good class restaurant will have an *à la carte* menu in addition to the *table d'hôte*, and additional equipment is necessary to deal with special dishes; in the hotel, where dinner parties and banquets are held, an output many times the normal has to be allowed for. The food service for the staff should also be remembered when the supply engineer is putting forward estimates.

There has been a complete departure, in recent years, from the practice of combining all cooking apparatus in large ranges. This method was a heritage from the days when the exigencies of chimney construction necessitated the use of one or two fireplaces providing heat by means of flues to the ovens and boiling hobs. Where flues are unnecessary, the equipment can be disposed to suit the convenience of the staff. Hence the development of separate apparatus designed to carry out specific cooking operations to the best advantage.

Specialised electrical apparatus offers an ideal method of carrying out the maximum amount of cooking in a given space with absolute cleanliness and perfect control. The boiling tables, with pan-racks above and below, can be situated at some point near to the ovens, thus permitting boiling operations to be attended to without interfering with those responsible for the oven work. Fish frying should be carried out on a separate range in place of frying in shallow pans placed on the boiling hob, whilst steaming is best carried out in a separate steaming oven fitted with a continuous water supply controlled by means of a ball valve.

The hot cupboard, in addition to being a receptacle for warming dishes, forms a convenient hot plate for carving meats if the top be planished and fitted with clamp-on elements; if the cupboard is large a water bath for the warming of soups and sauces with a separate control can be fitted on top also. The stockpot, in which meat and bones are boiled down to form the basis for soups, &c., is indispensable in large kitchens and the heat control should be such that the low heat just keeps the pot gently simmering. Electric grills are useful for light work, but in many chop-houses the coke grill is preferred on account of the subtle flavour it is supposed to impart to the meat.

Elaborate ventilating ducts are unnecessary in the electric kitchen, and if the air movement is sufficient to carry off the heavy cooking odours, no provision need be made to deal with high temperatures. In this respect, electricity is a blessing to those engaged in basement kitchens where adequate ventilation is not possible.

A vitreous enamel finish for heavy duty equipment improves the appearance of the kitchen and extends the life of the equipment due to its freedom from corrosion. As the low operating temperature reduces the carbonisation due to spilt food and grease it is only necessary to wipe the metal work with a cloth while it is still warm.

Costs and Charges

The consumption of electricity varies greatly between the various pieces of apparatus; in a high-class all-electric restaurant, boiling operations are likely to account for nearly a third of the total consumption and the roasting and baking operations for less than a sixth. The average relative consumption in an all-electric restaurant kitchen for various operations will be approximately as follows: Roasting, 7 per cent.; steaming, 4 per cent.; pastry baking, 5 per cent.; warming, 27 per cent.; boiling, 35 per cent.; frying, 18 per cent.; stock boiling, 4 per cent.; total, 100 per cent. The paucity of data regarding the consumption of electric cooking installations and the difficulty of obtaining figures on which to base estimates of consumption for prospective installations, induced the Manchester Corporation Electricity Department to install test meters temporarily in two recently connected electric kitchens. To each piece of apparatus a meter was connected and weekly readings were taken over a period of several months. These figures established the fact that low-temperature cooking operations accounted for the bulk of the consumption and that after the preliminary experimental stage the consumption of each piece of apparatus was practically constant each week.

Weekly readings of the kitchen supply meters are of great use in providing a check on the efficiency with which the equipment is being handled. The consumption per meal which may be anticipated in different types of kitchen (based on experience gained in various parts of the country) are :— All-electric restaurant with *à la carte* menu, 1 kWh; all-electric canteen kitchen, 0.75 kWh; steam-electric institution kitchen, 0.3 kWh.

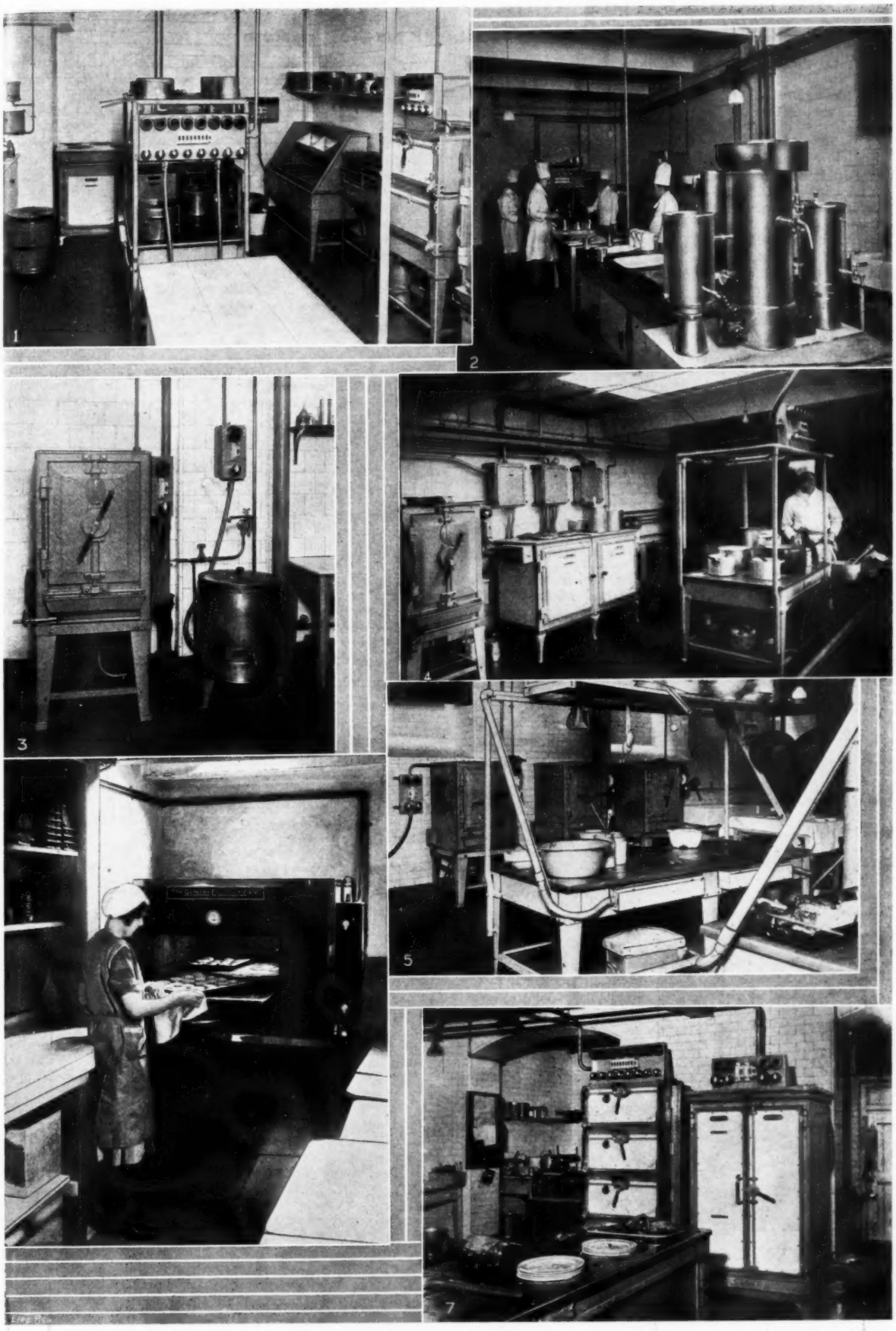
The offering of rates that will make electricity competitive with other heating agents is greatly simplified by the characteristics of the load, which is not seasonal, except in holiday centres, and is largely "off peak." In the majority of establishments the bulk of the cooking is done before midday and the afternoon period is generally occupied with the serving of teas. During this period, water boilers only are running and perhaps occasionally the fish fryer, so that even if "on peak" rates are charged for this portion of the equipment the additional cost is quite small. Few bakeries are likely to have an "on-peak" demand as the bulk of the goods must be ready for early afternoon delivery, so that for a restricted power supply it is rarely necessary to install a time switch.

The cooking and baking load is distinguished from industrial power loads by the absence of short-time and intermittent working and by the load factor being to a large extent guaranteed by the nature of the business. It is therefore possible to supply consumers on a flat or sliding-scale rate with every assurance that the fixed charges will be met.

To bring the advantages of electrical apparatus to general notice a sedulous canvass, supported by adequate publicity, is necessary. Demonstrations of electrical cooking and baking ovens have been of the greatest value, as the sight of the electric oven in actual operation goes a long way to convince prospective users that claims regarding cleanliness and efficiency are not exaggerated. The life of the average fuel-fired oven is from ten to twenty years. Contact should be made with bakers whose ovens require replacement, as an opportunity, if missed, is not likely to recur for a considerable time. A thorough knowledge of prospective purchasers in each area of supply is essential if the case for electrical baking is to be put opportunely and effectively.

Cooking devices for counter use, such as automatic boilers, grills, waffle irons, &c., promise to be of value; the "cafeteria" idea is spreading since the small service costs permit a cheapening of the price of the meals, and here the clean operation of electrical appliances is of the greatest advantage.

The accompanying illustrations show some of the electric kitchens and bakeries which have been put into operation in the Manchester supply area during the last two years, and for permission to publish these I am indebted to the Corporation Electricity Department, the *Manchester Guardian*, Messrs. Walker and Homfrays, the Waldorf City Hotel, and the General Electric Co., Ltd.



Large-scale Electric Cooking in the Manchester District

1. A range, boiling table and fish fryer; 2. A general view of the kitchen; and 3. The steaming oven and stockpot at the Piccadilly Hotel. 4. The *Manchester Guardian* staff restaurant kitchen. 5. A boiling table and steaming ovens at the Waldorf City Hotel. 6. A single-deck oven (G.E.C.) in a small bakery. 7. A pastry oven and cabinet roaster at the Waldorf City Hotel

Immunity from Shock. By S. H. Parsonage, Grad.I.E.E.

Tests of the artificial earthing system

AT the recent Contractors' Conference, Mr. G. C. Gilbert, in his paper on artificial earthing (reported in the ELECTRICAL REVIEW of July 7th), followed up his articles on the subject that have appeared from time to time in these columns.

I have had an opportunity of carrying out some practical tests with extremely satisfactory results. The artificial earths employed with the observed earth circuit resistance in each case were as follows:—(1) Buried galvanised-iron sheet; 70 ohms; area=6 sq. ft. approx., depth in soil=2 ft. approx. (2) Driven brass rod; 170 ohms; ½ in. dia. approx.; depth in soil=2 ft. 6in. approx. (3) Driven brass rod; 190 ohms, but in a different locality. (4) Driven iron bar; 275 ohms; section=1 in.×½ in. approx., depth in soil=3 ft. approx. (5) Driven iron tube; 295 ohms; 1 in. dia., depth in soil *only* 7 in.

Mr. S. H. Parsonage is a member of the sales staff of Messrs. Evershed & Vignoles, Ltd.

All of the above were embedded in damp soil of a chalky nature. The metal frame of an electric radiator was connected to these artificial earths *via* the trip coil of the protective switch, which was of the double-pole pattern with thermal overload releases. With connection to the short iron tube (case (5)), a dead short was purposely made between element and frame, and the switch opened instantaneously.

This test was tried repeatedly, and the result was always the same. A resistance of 500 ohms was inserted in the earth circuit. Here, again, isolation occurred without any noticeable delay. Even a garden fork (250 ohms), pushed at random into the ground, answered the purpose admirably!

When the thumb and one finger (of the same hand) were placed in contact with frame and element at the time of short-circuit, the shock experienced was inappreciable, due no doubt to the extremely rapid operation of the switch. As some people are much more susceptible to shock than others, the test was repeated on three non-electrical persons, who admitted that the shock was negligible; indeed, the layman, unfamiliar as he or she would be with the occasional slight shocks experienced by the practical engineer, would not normally be aware that a shock had been sustained.

The same experiment was repeated with a hand-to-hand circuit; the result was as before. The hand-to-hand resistances of the four persons, tested under identical conditions, were 50, 60, 100, and 130 thousands of ohms.

Perhaps months of gentle persuasion and tuition by a patient salesman in an endeavour to secure an "all-electric" consumer may be wasted due to prejudice created by her receiving even a very slight shock. The small extra initial outlay involved should therefore amply repay the supply authority, and the meter reader could operate the test switch as part of his routine.

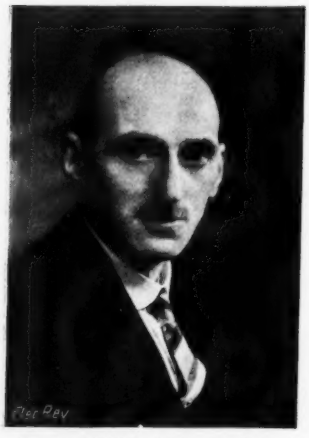
The method should be especially suitable for the small electric clippers used in hairdressing establishments. The metal portion and cutting edge is in contact with the neck, although the hairdresser himself is, as a rule, insulated. The feet, which are often damp due to wet weather or perspiration, may be on a metal foot-rest, which, in turn, would probably be in contact with the water piping. On no instruments I have seen have any precautions been taken (apart from insulation) to prevent risk of shock. Should a fault occur, the victim would (literally) "get it in the neck."

The practical experiences gained by those who have employed the system in particular fields would, I believe, be of interest to many readers.

Maintaining Water Level. By Vernon Walker, A.M.I.E.E.

Difficulties in the operation of high-pressure boilers

WITH the adoption of higher initial steam pressures and temperatures various combinations of boiler-feed pump arrangements and feed-water heating systems have been tried, but there appears to be no definite trend in this respect. In many cases the feed pump now handles water at temperatures as high as 300 deg. F., which with the higher pressures and the larger size of the units has increased the difficulties of the designer.



Mr. V. Walker is a member of the staff of the Bury Corporation Electricity Department

If the temperature of the water is increased before the feed-pump suction the power required is substantially increased, but this is sometimes offset by convenience in operation and by lower constructional costs. Closed feed systems should have adequate surge-tank capacity to accommodate the additional condensate resulting from increased load; otherwise the sensitiveness of the boiler water level, especially with varying load, will be aggravated.

The pressure in the modern feed range may be 150 to 200 lb. per sq. in. above the boiler pressure, and this calls for care in setting the economiser relief valves, and it may be necessary to employ excess-pressure valves before the feed water regulators where these are operated by drum level alone. These valves keep a constant pressure drop across the regulator, which otherwise, with constant water level and varying excess pressure, would give a correspondingly varying feed into the boiler.

Many high-pressure boilers are sensitive to sudden load changes due to variations in the volume of steam bubbles below the water level and in the rate of circulation; this causes "swelling and shrinkage" of the water level. With sudden loss of load the steam pressure rises, operating the safety valves and causing the water level in the gauge glass to fall, due to the suppression of steam bubbles, which will be aided by a reduction in the heat input to the boiler. If the load is suddenly increased, the water level will rise (perhaps even out of sight) due to the formation of steam bubbles. During the last decade the water space in the drum has been reduced considerably. In earlier designs the water capacity might be 1.5 lb. per lb. of steam generated per hr., whereas in modern designs it is as low as 0.2 lb. This has increased the proportion of steam below the surface of the water, which may be as much as 25 per cent. in volume.

Drum Diameter

High-pressure drums are the most expensive part of the equipment; cost goes up rapidly with increase in diameter, which has therefore been reduced, although for dry steam production alone the larger drum is much to be preferred. At higher steam pressures the specific gravity of the steam and water are nearer, so that changes in volume are not so great when the water becomes steam, and priming is less liable to occur on sudden load changes. No definite relation appears to have been followed between the capacity of boilers and the size of the drum. There is also a wide difference in the thickness of drums of equal diameter and the same approximate working pressure, which may be due to different factors of safety and constructional features.

Water walls have a decided effect upon the water level if the coal feed is suddenly interrupted, especially if the riser and downcomer areas are not sufficient and the circulation is poor. The rapid cooling of bare water walls decreases the proportion of steam bubbles to water, causing a greater drop in water level than if refractory walls were employed. With pulverised fuel the possibility of increasing the load more rapidly than with stoker-fired units has accentuated the "swelling and shrinkage" problem, a sudden interruption in fuel or air supply having the effect of dropping the water level. The use of air heaters has increased furnace temperatures and

enabled a much higher overload to be put on the boilers.

To overcome the difficulties of feeding boilers which are sensitive to water level and to allow the rate of feed to follow more closely the rate of steam flow (thus enabling a constant quantity of steam to be bled from the turbines in the case of reheating systems) a feed water regulator has been designed which takes its control from not only the water level but also from the steam and water flow. The demand for water being measured by the steam and water level, a variable level can be carried which increases with the load so preventing a sudden shrinkage with sudden drop in load. This ensures a constant weight of water in the boiler instead of a constant water level.

It was recently found that the velocity in the front generating tubes of a naval boiler was 4 ft. per sec., and farther back in the tube bank only 0.6 ft. per sec.; the test was made by placing Pitot tubes in the lower end of the generating tubes and connecting them by small pipes to an indicator through the shell of the boiler drum. In certain cases reversed circulation has been found in the upper tubes of horizontal tube boilers, and resistance in the supply and discharge connections may cause local circulation with a relative high steam bubble volume, causing overheating and corrosion. Starved circulation may cause disintegration of the metal through contact with the steam at high temperature; oxygen also must be eliminated.

The drum having a water capacity of 16-20 per cent. of the whole boiler, the storage will be evaporated in 3-10 minutes if feed water fails, and the level will have fallen below gauge glass level from half glass in 1-2 minutes or even less, and the time to be allowed to continue full-load rating or to give an alternative supply of feed water becomes of major importance. Should an electric pump break down, a change-over to a steam-driven unit must be made in, at the most, 30 seconds. This can be done if the valves are previously set, or there are a minimum number to open. When several pumps are in service sufficient reserve can be carried for any emergency. In certain cases the failure of the feed must be noted in 10-15 sec. if full load is to be maintained.

Increasing the range of the visible level by extension of the gauge glass would give more confidence to the firemen; electric alarms operated from feed-water pressure gauges are also useful.

Errors in Gauge Readings

When high-pressure boilers are heavily loaded the true level is not always accurately indicated by the gauge glass, as the mixture of steam bubbles and water in the drum caused by the discharge of steam through the water has a density lower than water and the gauge glass level is correspondingly low. There may also be an error due to temperature differences between the water in the drum and in the gauge glass. The National Electric Light Association (U.S.A.) recently issued a report on water-level problems which indicated that " shrinkage " is most noticeable with p.f. boilers with water walls at pressures of from 400 to 600 lb. per sq. in. The smaller specific volume of steam at higher pressures tends to maintain a more consistent level; thus, at 1,400 lb. per sq. in. a shrinkage from full load to no load of 3 to 6 in. takes place, whereas in one instance at 400 lb. a drop of 1.4 ft. is reported when the p.f. burners failed, and in another the water level fell nearly to the drum bottom when load was reduced suddenly.

Large drum capacity has no advantage with regard to load carrying capacity when feed water fails. The American practice is to use water columns to which gauge glasses are connected; this is liable to cause a difference in temperature between the water in the gauge glass and that in the drum. It is recommended that the steam connection should be left unlagged so that condensation will raise the temperature of the water in the glass to a point nearer the temperature of the water in the drum.

Some Driving Forces in the Industry: Berkeley and Young, Ltd.

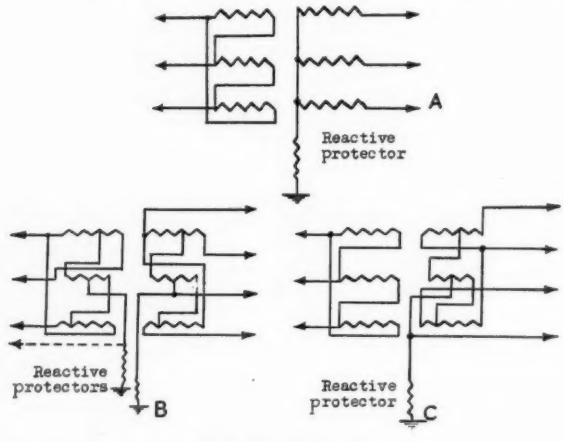
1. Mr. W. A. Lane, director and London manager. 2. Mr. N. W. Gilbert, chairman and managing director. 3. Mr. A. E. Jabet, director and secretary. 4. Mr. J. D. Mackenzie, agent for Scotland. 5. Mr. M. S. Bishop, assistant sales manager. 6. Mr. A. C. Bishop, sales manager. 7. Mr. J. Goode, technical and design department. 8. Mr. J. K. Wilkie (Messrs. J. K. Wilkie & Co., agents for Lancashire, Yorkshire, North of England, and Northern Ireland). 9. Mr. R. Millard, fan and motor sales, London. 10. Mr. W. S. Mansell, agent for South-East sales. 11. Mr. J. R. Webb, agent for S.W. England. 12. Mr. C. H. Harvey, works manager. (*Photographs* 1, 6, 9, 10, *and* 11 *by Jerome, Ltd.*)

System Connections. By W. T. Taylor, M.Inst.C.E., M.I.E.E.

A comparison of methods

THE two most common system connections are the delta and the star. With the delta connection it is impossible to bring out the neutral without a neutral-point transformer connected within the delta having an output at least equal to the kVA capacity of the protector. The star and the "T" connections, respectively, provide a neutral point. For the delta-star connection (see accompanying figure) a neutral-point transformer is not required.

On *one* or both sides of the primary or secondary we can obtain a delta-star system of connections by conversion of the delta or the open-delta or the open-delta-star to the "A" connections, or we may adopt this system in place of the common delta-star system. In the U.S.A. and Canada, where



System Connections

A. Delta-star with reactive protector. B. Three-phase, four-wire "A" system, primary and secondary. C. Delta-primary and "A" system secondary

the open-delta system is widely used, this system should prove quite useful, as it permits of both delta and star connections on one or both sides of the system, and the system voltage may be decreased or increased without changing the phase angle or relation, thus permitting the use of existing transformers and facilitating parallel operation. The system also provides a true neutral point on one or both sides of the system for connecting a protective inductive winding and securing symmetrical earthing load.

Earthing the neutral point through a non-inductive resistance will, under certain conditions, give satisfactory results against a phase fault to earth, but the protective value cannot be compared with that of an inductance of good design and careful adjustment. A resistance protector allows of a higher potential rise for a relatively longer time per oscillation; it permits of intermittent arcing at the fault, surge propagation, and a weakening or annealing of the line conductor at the arc. Only a few amps. are required to maintain an arc, and the resistance type of protector inherently fails to give the necessary time-lag and protective value. The inductive type of protector permits of a relatively slow potential rise and there is little or no chance of arc formation or surge propagation because the voltage rise per oscillation is too slow and short to accumulate potentials, and the characteristics are such that the currents through the inductance and capacity automatically neutralise each other.

Wood or Steel?

It is unfortunate that, at this stage of the art, engineers are not in agreement as to the best class of pole or tower materials (wood, steel, &c.) and the best electrical system to use. They do not agree as to the actual protective merits of the overhead earth wire, the best protective disposition of line conductors, the proper earthing to (and of) individual steel or concrete poles, or the proper treatment and protective value of the wood pole; neither do they agree that disturbances in overhead lines (resulting in insulation breakdown, caused by excess potential rise and flash over) are unduly aggravated by the use of steel poles. Wood poles and their fittings, system connections, and the installation of the overhead continuous earth wire or wires are still carried out improperly. Engineers do not as yet fully appreciate the screening effect and the protective value of the latter, and they still give too little attention to the effective earthing of metal poles and towers. With steel and concrete pole lines the protective overhead earth wire referred to above should make the best metallic contact with earth through every support. With wood pole lines the insulation and protective value of the poles should never be impaired by its use, and this principle should also be applied to the stayed poles.

The overhead continuous earth wire is a valuable protector when properly installed and used. It helps to reduce the voltage of travelling waves and thus to reduce the surge impedance value. The capacity current to earth when using a properly installed overhead earth wire will be less than for a pole line on the same route without it, and the earth capacity current will be less for a single-circuit than a double-circuit line. Disposition of the line conductors is also helpful to system protection. The horizontal arrangement of line conductors offers, in general, better protection from atmospheric disturbances as well as a lower capacity current to earth than the vertical arrangement of line conductors. Therefore, the higher-voltage single-circuit line with horizontal arrangement of conductors and overhead wire is the best protected and safest line.

Maintenance Costs Should Decide

In the choice of line, transformers and system connections, the first cost should always give way to the relative operating and maintenance and interruption of service costs spread over a period of years. Experience proves that wood and steel pole-line designs and materials are so satisfactory, and failures so rare, that mechanical-support weakness or breakage can be ruled out. The difference in cost between steel and wood line-supports may mean no more than the financial loss due to one or two service interruptions, and, as the ratio is relatively much greater than this, it would seem that the electrically safest and best protected (combined) line and system is that which inherently maintains its insulating qualities the longest and offers the greatest security against, and most effectively avoids, the entrance and creation of excess potentials and currents. The mechanical advantage of steel is more than offset by the higher mechanically stressed and more rapid fatigue failure in the greater number of higher-stressed insulators.

The lower protection given to line and system, relatively with steel, the greater strain on (and greater damage to) arrestors, the greater cost for equivalent lightning protection, more rapid fatigue failures in conductors, insufficient earthing of the steel, the constriction of lightning current through the steel pole endangering the foundation and line, greater height and less safe line location, inferior insulation for equal insulator rating, make the steel-tower less reliable than the wood pole line. One steel tower may have a larger number of danger points and cause more interruptions than a dozen wood poles.

We may conclude that the requirements of electrical safety, system flexibility, and operating reliability and protection of line and delta-star system can be met by the following practice:

System.	Voltage.	System Installation.
(A.)	E.H.V.	Solid-earthed neutral, or earthed as suggested herein, or automatically earthed only when a phase fault to earth occurs. Single-circuit pole line. (Where initial economy demands a double-circuit pole line, this should conform to the conductor arrangement suggested herein, with same phase conductors located above each other to lessen vertical spacings and system disturbances, such as phase-to-phase arcs which readily spread upwards during insulator flash over.) Single-phase transformer units preferable. Properly placed and installed wood poles or frames and fittings possessing full insulating value. (When stronger or more durable materials must be used, as at terminals, crossings, or because of adverse climatic conditions, install reinforced concrete or steel but always increase line insulation accordingly.) Horizontal configuration of line conductors. (The use of stays lowers the impulse voltage, and their situation on poles is so important that the protective advantages of this arrangement may be frustrated if improperly done.) Overhead continuous earth wire or wires most effectively placed and earthed at frequent and suitable intervals independent and separate from the wood line-supports.
(B.)	H.V.	Earthed neutral, as above. Single-phase (surge-proof) transformers preferred. Properly installed wood poles and fittings as suggested above. Horizontal or delta arrangement of conductors. Overhead continuous earth wire or wires effectively earthed, as suggested above.
(C.)	L.V. (Secondary).	Solid (low-resistance) earthed-neutral system, preferably multiple-earthed. Properly installed wood poles and fittings. Horizontal arrangement of line conductors with neutral conductor on the outside or the uppermost, or, vertical arrangement of conductors with neutral conductor topmost.

Electric Cooking in Hospital Kitchens

The installation at the Gartloch Institution, Glasgow

THE Gartloch Mental Hospital has two kitchens. The asylum kitchen caters for an average of 820 patients. All cooking is done by steam with the exception of a large six-pan fish fryer and a small electric cooker. The fish fryer consists of six pans 20 by 20 by 9 in. each loaded to 10 kW, total 60 kW; the overall length is over 22 ft. The pans are made of welded steel rounded at the corners, jointed to the underside of the cast-iron hob and made oil tight. The "Chromalox" type elements are clamped to the bottom by a special arrangement so that the bottom of the pan is not pierced in any way. Each pan is controlled by two ironclad double-pole switches, one controlling 7 kW and the other 3 kW. As yet there are no consumption figures for this equipment.

1

three heat control switches and pilot lamps; an electric boiling table with four plates 8 in. by 8 in., each loaded 1.6 kW; and two plates, 16 in. by 8 in., loaded 3.2 kW each, total 12.8 kW; a two-compartment electric griller and toaster, each compartment 15 in. by 15 in., 3 kW, total 6 kW; a three-pan fish fryer, pans 20 in. by 20 in. by 9 in., each 10 kW, total 30 kW, similar in construction to the six-pan range described above; and an electric baking plate, 6 kW. The total loading of the equipment in the hospital kitchen is 69.9 kW. All the electrical appliances are finished in mottled grey vitreous enamel, with bright parts nickel plated, and were manufactured by Archibald Low & Sons, Ltd., Glasgow.

From June 1st to September 13th, 1932, 5,848 kWh was used

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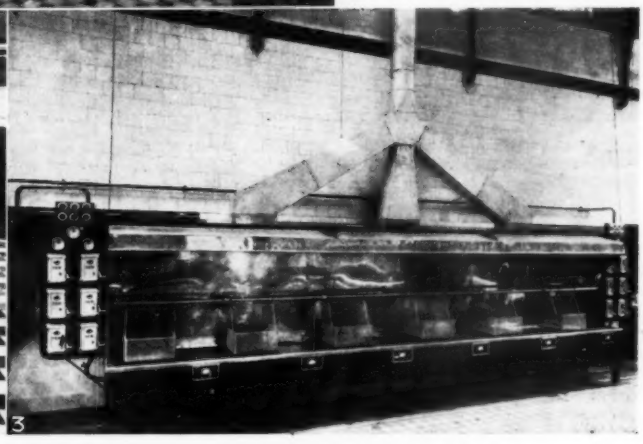

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1. A general view of the kitchen. 2. An electric boiling table. 3. A six-pan fish-frying range

The hospital kitchen does all the cooking for 150 officials and staff as well as for the sick and special diet for hospital patients. In addition, on certain days fried fish and chips are cooked for about 150 patients. The equipment consists of a combination of steam and electric cooking appliances, the former being used for the preparation of soups, stews, steamed vegetables, &c., and the electrical apparatus for roasting, grilling, frying, baking and toasting.

The electrical equipment consists of the following apparatus: A battery of three "Highlow" electric roasting ovens, inside sizes 22 in. by 22 in. by 22 in., 5 kW each mounted on legs with

in the hospital kitchen, giving an average daily consumption of 47.5 kWh (based on a staff of 150). The average consumption per person per day was approximately 0.32 kWh, but this figure was appreciably on the high side, as a considerable amount of cooking for patients was also carried out.

At ½d. per kWh the average weekly cost of electricity works out at about 14s. The coal equipment, which the electrical apparatus supplanted, consumed on an average about 30 cwt. of household coal weekly at an average cost of 27s. per week, so that the cooking costs have been halved despite the wider use made of the electrical apparatus.

Lubricating Clay Dies Electrically

ANOTHER step in the electrification of potteries, more particularly those turning out terra cotta, refractories, and bricks, is reported from the United States. Mr. J. O. Everhart, of the Engineering Experimenting Station, Ohio State University, gives an interesting account of work being carried on in his department for substituting electricity for oil or steam in the lubrication of machine dies for solid blocks, hollow blocks, and bricks.

When a direct current is passed through a stiff mixture of clay and water there follows a concentration of moisture at the negative pole; consequently, if the die is suitably connected electrically, a film of moisture is formed between the moulded clay block and the mould, with the result that it is easily removed. It is claimed for electricity that it is cheaper than oil or steam lubrication and is more easily handled. The new system entails very little alteration of the moulds, the principal difference being that there is no need to provide an oil reservoir or ducts for the oil or steam. Practice varies slightly. As a rule the anode consists of a ring of suitable shape mounted at the back of the mould, which must be effectively insulated from the rest of the machine.

Three factories have been exploiting the system commercially and report favourably. In one case check was kept on consumption of power by the machine, which was reduced by 22.4 per cent. with a 10 per cent. increase in output. However, part of the power saved in moulding operations was expended in running the motor generator supplying the d.c. lubricating current. It was found at another plant that more satisfactory results were obtained if the cores were charged positively and the liners negatively.

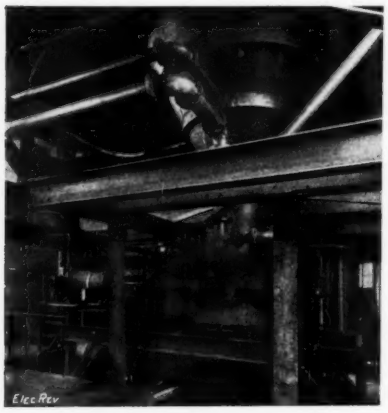
A factory manufacturing refractory goods obtained good results with electrical lubrication of moulds for jointing hand-moulded special shapes. They used aluminium liners and wooden frames, the d.c. generator operating at 200 V. In the first instance, both sides and bottom sections were connected to the negative line, but the extraction of mixture proved too active, resulting in delay in the removal of the moulded articles. So the bottoms of the dies were insulated from the sides, the latter being charged negatively and the bottom used as a positive electrode, when unmoulding became easy and swift.

Experiments are being carried out to determine the permissible voltages, desirable moisture content, influence of thickness of ware, possible advantages of the use of electrolytes, and suitable insulation of material.

A Coal-cleaning Installation

THE first commercial coal-washing plant operated on the "Chance" patent sand flotation system in this country has recently been completed at Messrs. J. & J. Charlesworth's Newmarket Colliery, Wakefield. By this system forty million tons of coal is treated annually in America, and the sole manufacturing rights for the British Empire for the equipment have been acquired by the Fraser & Chalmers Engineering Works (General Electric Co., Ltd.).

The process is based on the float and sink method of testing coal, a fluid mass of sand and water being utilised as the high-density medium. The density of sand and water kept in a fluid state by hydraulic agitation can be controlled by varying the amount of water only, the density being independent of the amount of sand present. Thus the mixture can be arranged so that coal will float while impurities sink, and the difference between the specific gravities causes separation of the coal and refuse.



Base of the cone classifier column, refuse chamber and refuse shaker

This is actually the simple principle of operation employed, and in practice a cone separator contains the sand and water. The de-dusted raw coal is fed into the fluid mass, and the controlled agitation water is introduced *via* valves through three rings at the sides of the cone and also to a classifier column at the base of the cone. The clean coal is carried round on the top of the fluid mass to an exit weir, where it flows out on to a clean-coal shaker sizing screen carried by sand and water overflow surmounted by a layer of clean water.

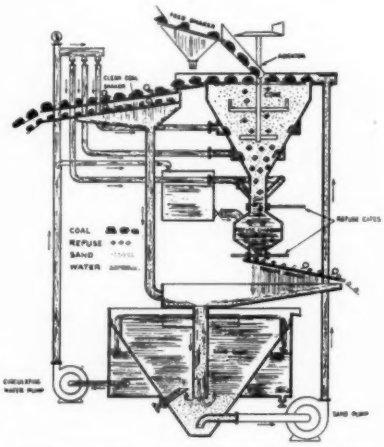
On reaching the clean-coal shaker the sand and water pass through it while the coal rolls on through the clear water layer by which it is automatically de-sanded. Clean water sprays then ensure absolute freedom from sand and improve the appearance of the coal. The refuse which sinks through the fluid mass collects in the classifier column and the base of the cone, whence it is evacuated.

Between the classifier column and the refuse shaker is a refuse chamber fitted with top and bottom refuse gates which are opened and shut by air-operated thrust cylinders. These gates are opened and closed alternately, remaining open for predetermined times, so that periodically quantities of refuse and sand and water are discharged from the refuse chamber on to the refuse shaker screen, the sand and water being passed through the screen, collected and returned to the main sand sump, while the refuse is discharged from the screen for disposal or retreatment. As soon as the bottom refuse gate is closed a water valve opens to fill the refuse chamber with water, when a pressure switch trips, thereby shutting the water-filling valve and allowing the top gate to open for recommencement of the cycle.

The air supplied to the thrust cylinder and the water-filling valve is controlled by a solenoid-operated piston valve, and the time of opening of each valve can be adjusted to suit requirements by the electric timers on the refuse gate control panel. Interlocking prevents both gates opening at once. The adjustable time cycle is arranged to deal with the maximum rate at which refuse is likely to be fed into the plant and there is no need to alter the timing for lower rates.

The Disposal of Refuse

A revolving mechanical agitator assists the hydraulic agitation, prevents the sand from banking up on the sides of the cone, and also assists the flow of coal round from the feed chute to the exit weir. The main sand sump is designed to give a very low upward velocity, so that the sand remains at the bottom while the water overflows into the water sump from which the circulating water is pumped for agitation and refuse-chamber filling. The concentrated mixture of sand and water is pumped back to the cone from the bottom of the sand sump by a special pump. A refuse sand sump receives the small amount of sand and water from the refuse shaker, which mixture is pumped to the sand and water sump. Fine coal and refuse not caught by the clean-coal and refuse shakers is carried with the sand and water to the main sand sump which acts like a second cone run at a high density.



Diagrammatic arrangement of the plant

A slurry discharge pipe fitted with a valve projects into the sand sump just above the sand level when the plant is at rest. Some very fine slurry is carried to the water sump, where it either settles and is removed by slurry drains, or is carried to waste by the small amount of water that is continually overflowing as a precaution against contamination. To reduce the amount of fines to be dealt with a certain proportion of the water discharged from the cone is by-passed over a slurry screen alongside the refuse shaker.

The plant described has a capacity of 100 tons per hour and deals with the whole of the pit output between 6-in. and $\frac{1}{16}$-in. screen sizes. The $\frac{1}{16}$-in. coal will be dealt with by Fraser and Chalmers pulverised-fuel plant, which will serve four new Lancashire boilers.

Top of the sand and water cone; on left: a coalometer for testing coal and refuse

Bottom of the main sand and water sump

Rugby Revisited

The new B.T.H.—Hotpoint home appliance factory

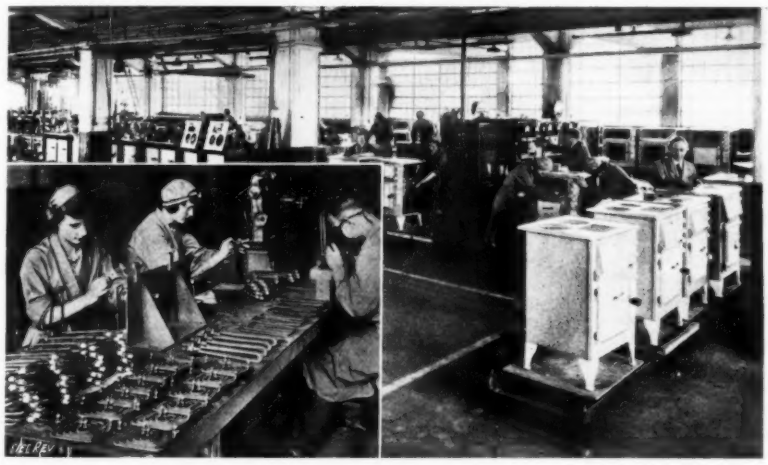
WHAT a transformation has taken place at the Rugby works of the British Thomson-Houston Co., Ltd., since we last visited them! The past two years have afforded opportunities for material readjustments in the seventy factory buildings of this organisation, which comprises seven or eight distinct businesses.

Happily, as Mr. H. N. Sporborg, director, and Mr. A. P. Young, works manager, reminded us at luncheon, the downward tendency of the output curve, which continued throughout 1931-32, was checked in January last and there has since been a steady rise. The lamp works are busy and in the heavy engineering shops turbo-generator sets are being made for export to the Continent and the Far East; large motors for steel rolling mills and paper-making plant, with special control gear; besides rotary convertors and mercury-vapour rectifiers for exceptional voltages and currents.

Meanwhile at the Coventry works, where the manufacture of radio earphones commenced less than ten years ago, loudspeakers are now being produced at a cost and sold at a price both lower than those of the original earphones, while sound-film equipment has been made for a large number of cinema theatres throughout the country.

At the Rugby works a large three-storey factory has been reorganised for the exclusive production of domestic appliances on the conveyor-assembly principle. New machine tools

The B.T.-H. home appliance factory



Final assembly and test of electric cookers. Inset: Fitting terminals to "Torribar" heating elements

with individual motor drives have been installed throughout, many of them specially designed for particular purposes, including one of the largest brake-presses in England and arc-welding machines operated by thyratron valves for the accurate control of voltage, current, and duration of welding period.

Refrigeration Production

Similarly, in the machining, heat-treatment, and vitreous-enamelling sections, the plant is the most modern of its kind and some of it is undoubtedly unique. The orderly layout and regular and smooth through-put of parts are impressive. Operatives, clad in different coloured overalls in each section, pay scrupulous attention to fit and finish. The precision of some of the work is remarkable, certain parts of the refrigerator compressor pump, for instance, being made to an accuracy of 0.0001 in. Here the manufacture of the B.T.-H refrigerator in its entirety commenced in May last and the present capacity is 200 per week. The inner and outer sections of the cabinet with supporting fins and thermal insulation between are made of sheet steel pressed into shape, electrically welded in jigs and then planished to ensure smooth surfaces for enamelling.

The refrigerator unit is a separate entity (made in another section of the factory), which fits into the top of the cabinet with the freezing chamber inside and the condenser exposed outside. The motor-driven compressor drains sulphur dioxide vapour from the evaporator (freezing chamber) so reducing the pressure, which allows the liquid SO_2 to boil (evaporate) freely and absorb heat from the cabinet during the change from liquid to vapour. The pump draws the vapour from the evaporator, forces it through external condenser coils wherein it reliquefies on cooling and drains down into a float chamber, whence some of the liquid is readmitted to the evaporator each time the float lifts to complete the cycle. All the working parts are enclosed in a sealed drawn-steel dome round the outside of which the condensing tube is coiled on cooling fins. Lubricating oil is fed under pressure to all bearings and the refrigerant is introduced after the chamber has been dried out and evacuated.

This is claimed to be the only hermetically sealed refrigerating unit made in this country. Total enclosure of the working parts with three-point spring suspension ensures silent operation, minimises vibration, and obviates any need for attention when in service. Assembly necessitates a high standard of workmanship and careful mating of component parts; optical instruments are used for checking dimensions.

Left: Assembling refrigerator evaporator units. Centre: A compressor unit before sealing up. Right: Final assembly of washing machines

The manufacture of the "Torribar" heating elements for "B.T.H.-Hotpoint" cookers, boiling plates, and immersion heaters is an ingenious process. Nichrome wire wound into a spiral is inserted into a stainless steel tube and secured at each end. Indentations are next made in the tube, two at right angles at short intervals throughout the whole length, thus centralising the spiral in the tube, which is then filled with dry magnesium oxide powder and its ends sealed. The spiral element being firmly secured by the powder, the tube indentations are removed by swaging machines. The tube is then annealed, after which its diameter is reduced by further swaging, which compresses the oxide into a homogeneous mass, thus holding the spiral rigidly concentric.

The magnesium acts as an electrical insulator and also protects the element from oxidisation and damage from spilt liquids; at the same time the powder freely conducts the heat from the spiral to the outer steel sheath, which glows when in use. The oxide powder is packed sufficiently tightly to maintain concentricity of the element while the tube is being bent to the required shape before the attachment of end ferrules and terminals, but not so tightly as to impede the expansion of the spiral when in service.

The exactitude with which the cookers are assembled should ensure trouble-free service, special features of the four models made being the extreme accessibility of the fuses and switch connections, and thorough electrical bonding of all metal parts for earthing. The new high-speed radiant boiling plate has three-heat control and is elegantly finished.

The immersion heater is of "Torribar" construction, but enclosed in solid-drawn copper tube. A mechanically sound joint assures watertightness and is capable of being readily fitted to an existing tank, while a development now nearing completion is an adaption for heating quick melting metals.

The clothes washing machine is of strong and rigid construction, there being nothing to rust or corrode. A single 0.25-h.p. motor drives both the gyrator and wringer through machine-cut gearing, with simple control mechanism so designed as to make the wringer and an electric ironer quite easily interchangeable. The machine is of neat design and good workmanship throughout, each model being tested for quiet operation in a sound-proof chamber.

B.T.-H. refrigerator sales in Great Britain are controlled by the International Refrigerator Co., Ltd., while the cookers, washing machines, boiling plates, and immersion heaters made at Rugby are sold in this country by the Hotpoint Electric Appliance Co., Ltd.

The Battersea Gas-washing Plant

IN our last issue (page 50) we gave an account of a paper by Mr. G. W. Hewson, Dr. S. L. Pearce, and Messrs. A. Pollitt and R. L. Rees on the Battersea flue-gas treatment plant presented at the annual meeting of the Society of Chemical Industry at Newcastle.

In the discussion which followed the reading of the paper Mr. G. Menhebel (I.C.I., Billingham) said that very little was known on this subject when the authors commenced their experiments. Under the Alkali Acts the chemical industry was allowed to put into the atmosphere a flue gas containing 4 grains of sulphur trioxide per cu. ft.—or 1.8 gr. of sulphur per cu. ft.—whereas the work done by the authors brought the amount down to one-hundredth of this, *viz.*, 0.02 gr. per cu. ft., which was scarcely detectable by smell.

Mr. Menhebel gave an account of some work carried out by Imperial Chemical Industries, Ltd., at Billingham, in conjunction with Messrs. Howden, as the result of which it had been determined that a scrubber should always possess two characteristics—some means of bringing the gas by turbulence up to the liquid, and means of thorough mixing and turbulence of the liquid as it descended from the scrubber. Those characteristics were obtained by allowing the liquid to fall in films over a close-lattice type of packing. A corrugated type of de-duster which the I.C.I. had devised and patented, which had been applied experimentally to the Brimsdown power station, was then illustrated. The sulphur elimination with this apparatus was said to be between 70 and 80 per cent. A greater degree of sulphur elimination could have been obtained by increasing the size of the plant, but as this would then have become relatively large and expensive it was considered that final desulphurisation of de-dusted gas could better be done in a grid-packed tower. Simple laboratory experiments showed that 98 per cent. SO_2 absorption was to be expected with a 5 ft. depth of ¾-in. pitch packing with a gas speed of 7 ft. per second, provided the water was always kept slightly alkaline.

A Commercial Sized Scrubber

As it was decided to market a plant for de-dusting and sulphur elimination from boiler flue gases, a smaller commercial size scrubber of 4 ft. by 4 ft. cross-section was erected at Billingham, taking part of the gas from the flue after one of the de-dusters. The packing depth was 5 ft. 4 in. and the gas speed was 7 ft. per second at 240 deg. F. The plant had completely justified the laboratory researches, the efficiency of sulphur removal being just over 98 per cent. when firing coal containing from 2 to 3 per cent. sulphur. No choking with dust or scale had occurred after several hundred hours' running. This grid scrubber was specially suitable for stations where water supplies were limited and it was not possible to make use of the alkali of the condenser water. If used under acid water conditions it would, of course, be necessary to employ a greater depth of packing.

Referring to the Battersea plant, Mr. Menhebel said he considered the number of sprays—1,400—a real objection as many of them did not appear to be accessible for cleaning when the plant was in commission. Finally, he said that corrosion would be a serious difficulty in the downtake if the liquid were allowed to reach a pH of 3.5. The cast-iron tubes in the Billingham de-dusters showed decided corrosion when the pH of the water was 4.

Dr. R. Lessing said that as the main lines of the engineering design of the apparatus at Battersea were definitely adopted before the fundamental knowledge had been obtained, the plant was probably more complicated, and certainly of much larger dimensions, than it would have been if it had been laid out under more favourable conditions. He personally was associated with the design of a plant for a very large base-load station in the London area, and the outstanding feature, apart from considerable differences in layout and internal arrangement of the gas-washing plant, was on the process side. There was no difficulty, given a suitable plant, in extracting 98 or even 100 per cent. of sulphur dioxide from chimney gases. At the same time, if these very large power plants were multiplied and other industrial undertakings also began to extract sulphur from combustion gases, then the effluent question would become very serious.

A Closed Cycle System Proposed

From this point of view, he had been considering an absolutely closed cycle and felt confident that a large power station could be provided with a plant for the extraction of practically the whole of its sulphur-dioxide content without discharging anything into the river for a space of twelve months or so, there remaining only the solid salts which were necessary for the neutralising of the moisture, which should not exceed 50 per cent. of the mud discharge. He asked if the corrosion of the various scrubbing elements in the Battersea plant was intentional for the purpose of supplying the iron catalyst required in the reaction. If so, what factor of safety had been assumed and what time margin was allowed before trouble arose from excessive scaling and dissolving of these scrubber sections?

Dr. A. Crawford (Ashington Colliery) said there was not a very large stock of coal in the country with such a low sulphur content as from 0.8 to 1 per cent. as mentioned in the paper. What would be the cost of removing sulphur from coal containing 1.5 per cent. of sulphur? Dr. J. B. Firth suggested that if the effluent from Battersea was discharged into an ordinary river of reasonable purity and not one like the Thames, which was a rapidly moving body of water, there would be considerable trouble. Mr. John Sutherland asked what was included in the authors' figure of 3d. per ton of coal burned, as representing the cost of the process. Did it include repairs, interest, and depreciation?

Dr. Pearce, in a brief comment on the discussion—to which he promised to reply in full in writing—said that the Battersea station had had only a little load on so that any figures given at the moment would possibly be misleading. The cost of 3d. per ton of coal burned included the lime and pumping. The additional capital cost amounted to not less than 10d. per ton, to which should be added 2d. to cover maintenance, so that the total figure would be in the neighbourhood of 15d. per ton as representing the cost of installing and operating the plant.

The transmission of an equivalent amount of energy from a site fifteen or twenty miles away would have cost something like £2,500,000, and the incidence of the capital charges, line, and transformer losses and maintenance in that case would have been equivalent to 60d. per ton, and the difference in favour of Battersea with this process meant a sum of £185,000 per annum. Even if a less ornate station was built farther out without gas-washing plant there would still be a margin in favour of the completed Battersea station of something like £75,000 per annum.

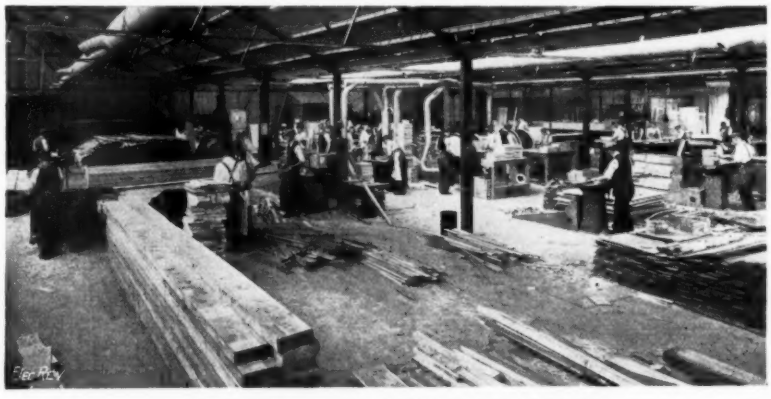
Electricity in Woodworking

A RECENT visit to the works of Messrs. Wootton & Co., Ltd., at Ponders End, which is devoted entirely to the production of woodwork for the electrical industry—principally meter boards and switch blocks—was a reminder of the importance of such accessories which perhaps tend to become obscured by the more directly electrical equipment. The factory is about 120 ft. square in four 30-ft. bays.

Mr. C. W. Wootton, director and secretary, drew our attention particularly to the artificial lighting installed. Most of the floor space is taken up by the machine shop, which is equipped with fifty-one Benjamin Electric industrial reflectors with 150-W lamps. An efficient plenum system of heating and ventilation serves the factory proper. The lay-out is arranged to afford easy transit of the materials on the continuous flow principle from one process to another. We saw heavy circular saws, planing and thicknessing machines, a battery of small dimension saws, corner locking machines, spindle moulders, drilling machines, and sandpaper discs and drums, in addition to specially designed machines and lathes which are adapted for the mass production of switch blocks. One lathe is fitted with six tools and produces the round block from the square wood in one operation.

All these machines are group-driven by electric motors from below-ground shafting. There are also electrically heated glue pots and a special glue tank similarly equipped. In special rooms paint spraying is carried out extensively, and in one spraying cubicle there are about forty revolving vertical spindles, each of which carries a circular block for treatment.

Some of the specially designed paint-spraying equipment



The machine shop at Messrs. Wootton's works

We were informed by the company that some millions of meter boards have been produced in the works since its establishment six or seven years ago, and that four or five blocks are made to every meter board. Since the introduction of import duties the switch-block demand has increased by 50 per cent. The plywood meter board is very popular. It is both the superior and the cheaper article, if made from the correct plywood (dry process). Dry process plywood is obtained from Finland, and the seasoned veneers are stuck with casine. The cheaper wet process plywood is produced from unseasoned material and stuck with ordinary glue. We learned that plywood cannot be produced commercially in this country, probably because we depend on the foreigner for the raw material.

English insulators are used in the plywood boards, and it was encouraging to learn how an English pottery, by specially adapting its firing equipment, enabled the company to meet very severe foreign competition.

Electric Colliery Winders

TWO new electric winders have recently been put into commission at the Boldon Colliery of the Harton Coal Co., both equipments having replaced existing steam winders without interfering with the output of the pits. No. 1 winder is intended to deal with men only, and is designed to raise between forty-five and sixty men accommodated on three decks in 90 seconds from a depth of 1,560 ft. The drum is of the bicylindro-conical type, the small and large diameters being respectively 10 ft. and 14 ft. The drive is through single reduction double-helical gears by an asynchronous induction motor having a continuous rating of 380 h.p. at a normal full-load speed of 285 r.p.m. and a " pull-out " torque equivalent to 800 h.p.

The main electricity supply to the equipment is brought to the main switch cubicle in the winder house at a pressure of 5,500 V and transformed down to 2,700 V for the motor, the control of the latter being effected by means of oil-immersed reversing contactors in the stator circuit and a moving-electrode controller in the rotor circuit.

No. 2 winder is operated on the Ward-Leonard principle, and has two 16 ft. diameter cylindrical drums, each 5 ft. 6 in. wide, one being keyed to the drum shaft, and the other connected by means of a multiple-toothed clutch to facilitate rope adjustment. The drum is driven through single-reduction double helical gears by a 1,860-h.p., 600-V d.c. motor, which has a normal full-load speed of 400 r.p.m. and is capable of exerting an overload torque equivalent to 3,720 h.p. The motor is of the compensated shunt-wound separately excited type, and takes its main supply from a 1,200-kW, 600-r.p.m. motor-generator set.

The generator is capable of a peak of 3,000 kW, and is direct coupled to a 1,200-h.p. self-starting salient-pole synchronous motor. The latter takes its supply *via* a main switch cubicle from the 5,500-V lines, and has a pull-out torque equivalent to 4,200 h.p. It is designed to give its best performance when working with a leading power factor of 0.9. There are two overhung exciters on the motor-generator set, one for supplying the d.c. generator and the other for the excitation of the synchronous motor field coils. The winder has been designed to raise a net load of 10 tons in four decks from a depth of 1,560 ft. at a maximum velocity of 250 tons per hour when two decking levels are used.

Both equipments are controlled on the M-V patent " Two-Lever " system, which eliminates the separate lever for emergency tripping and resetting of the brakes. Complete overwind and overspeed protection is afforded on both equipments by a type " C " Lilly controller. In addition, cam gear is fitted on the Ward-Leonard equipment to control the acceleration and deceleration periods. The Metropolitan-Vickers Electrical Co., Ltd., was responsible for the electrical equipment of both winders.

" Isoperm " Cores for Pupin Coils

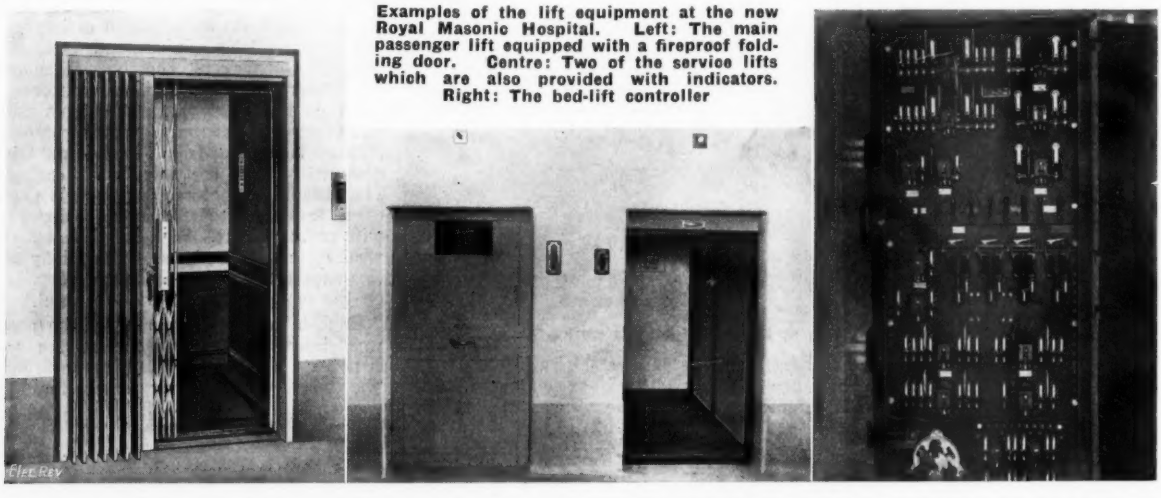
THE requirements imposed on Pupin loading coils for telephone circuits as regards high inductance, low ohmic resistance, small dimensions and high magnetic stability, are to some extent contradictory but depend mainly on the properties of the core material. Powder cores with a permeability of 70 to 80 have been made in the smallest sizes economically compatible with ring winding and, according to *Elektrotechnische Zeitschrift*, further progress has now been achieved by the A.E.G., which has developed a series of core materials capable of being used in the form of plates or strip. These materials, the " isoperms," consist of iron-nickel alloys with 40-60 per cent. of iron and additions of aluminium or copper. Permeabilities up to 100 are secured, with high stability and a hysteresis lower than that of the best powder cores. It is further claimed that a core permeability of 75 can be obtained easily, in which case an " isoperm " core of 700 cu. cm. has about the same characteristics as a powder core of 1,065 cu. cm., thus effecting 35 per cent. saving of space. The new material offers the possibility of substituting cylindrical for ring-shaped coils, making possible a further reduction in dimensions and cost.

A Hospital Lift Installation

The new Freemasons' institution at Ravenscourt Park

THERE can be few more comprehensive electric lift installations than that at the Royal Masonic Hospital and Nursing Home, Ravenscourt Park, which was inaugurated by the King and Queen on July 12th. There are bed lifts for moving patients, staff and passenger lifts, goods lifts for the conveyance of supplies, food lifts between the kitchens and ward pantries, linen lifts from and to the laundry, soiled dressings lifts from the operating theatres to the incinerators, lifts which take instruments and dressings to and from the sterilisers, a lift for bringing X-ray plates from the developing room to the operating theatres, and even a body lift down to the mortuary. This scheme has involved the provision of sixteen lifts of different sizes, all designed, manufactured, and installed by Marryat and Scott, Ltd. They are all unattended, being operated automatically by push-buttons, while luminous and audible signals indicate the positions of all lifts. Safety and silence of operation have received attention.

High-speed travel necessitates maximum rates of acceleration and deceleration consistent with least passenger discomfort and minimum loss of time during floor leveling. As accurate landing registration by "inching" is wasteful of both time and energy, the "Leveltric" system has been devised and patented by Mr. Murray D. Scott to simply the problem. To save floor space a small auxiliary motor is mounted on top of the main motor, which drives the lift through normal gearing in the usual way. The auxiliary motor is connected to the shaft through silent chain gear, the speed reduction of which is about ten to one, the drive being transmitted by a special clutch.



Examples of the lift equipment at the new Royal Masonic Hospital. Left: The main passenger lift equipped with a fireproof folding door. Centre: Two of the service lifts which are also provided with indicators. Right: The bed-lift controller

This clutch provides, in effect, for "free wheeling" in either direction of rotation. It consists essentially of the disc (chain driven by the auxiliary motor) which is mounted on ball bearings concentrically with the main motor shaft, and connected by dumb-bell links to a free clutch plate. The latter is carried on roller bearings in such a way that it can slide axially on the shaft (its movement being controlled by a light drag brake) and engage or disengage with a second clutch plate, which is fixed to the main shaft between the other two discs. Thus when the auxiliary motor commences to chain drive the first disc, the angular displacement lag introduced by the action of the drag brake causes the free clutch plate to be drawn (by the dumb-bell links) along the shaft and engage with the fixed clutch plate, so revolving the main shaft.

The Levelling Operation

In this way the lift is driven upwards or downwards at low speed. As the speed increases the main motor is switched on and the shaft is then temporarily driven by both motors. So soon, however, as the speed of the main motor exceeds that of the chain-driven disc, the clutch automatically disengages, due to the thrust of the dumb-bell links and the action of self-centring springs. The load being thus removed from the auxiliary motor, it is switched off by an appropriate movement of the controller. Similarly, to stop the lift the main motor is switched off first, and when the shaft speed falls the small motor assumes the drive and brings the cage slowly to the floor level. When stopping, the change-over from one motor to the other is effected by a levelling switch mounted on the lift cage and engaging with a ramp in the shaft at each landing. This switch has two plungers which are withdrawn by a solenoid energised from the main motor circuit while the lift is travelling between intermediate floors. On approaching the landing at which the cage is to stop, the main motor is switched off and the solenoid is thus de-energised, allowing the plungers to be pushed forward by springs, so engaging with the ramp and starting the auxiliary motor to drive the lift up or down until level, according to whether the plungers make contact with the upper or lower section of the ramp.

Special Control Features

A "whirlpool" switch operates in conjunction with the "Leveltric" gear, the direction of rotation being governed by a rudder whose position in an oil bath is determined by the direction of flow of oil, which is, in turn, dependent on the direction of rotation of a shaft-driven propeller, thus forming an interlock with a small overspeed centrifugal governor and interlocking contacts on the control panel. Special features of the control panel include the use of an eddy-current disc device for correcting phase reversal and a Westinghouse metal rectifier for the control and brake circuits. All springs operate in compression, never in tension; there is an overload trip for each phase; the reversing contactors have both electrical and mechanical interlocks, so that one only can operate at a time; and the carbon contacts are easily replaceable by hand without the necessity for the use of tools.

The service lifts have vertical shutters, top and bottom equally balanced without counter weights, and electrical and mechanical locks with three catches. Besides a warning bell, a lamp signals the arrival of the cage in answer to a call. The bed lifts have three-piece sliding doors with electrical and mechanical locks, handsome cellulose finished cars and concealed lighting. The passenger lifts are similar, except that the landing doors are of the folding fan or bellows type, harmonising with the corridor wall and completely enclosing the well shaft.

Other Electrical Features

An unusual feature of this building is the provision of four large nearly circular sun balconies which were constructed entirely of welded steel, the total load carried being 600 tons. Ordinary riveted steelwork could not have been used to comply with the conditions of architectural design. Dorman Long & Co., Ltd., therefore employed the electric arc method of welding with coated electrodes supplied by the Quasi-Arc Co. Ltd. Horizontal, vertical and overhead welding was carried out successfully, most of the fabrication being done in the factory and only the necessary connections welded on the site.

The central sterilising plant was designed and installed by Manlove, Alliott & Co., Ltd. The two dressings sterilisers, which can if desired operate at a temperature of 280 deg. F., which is equivalent to a steam pressure of 35 lb. per sq. in., are fitted with a central closing door which has a patent hydraulic gear, in addition to this firm's patent "Mastrol" valve by which the whole of the operations of the machine are regulated by one handwheel fitted with special lamps which light up and denote the operation in progress. There are eight ward sterilising rooms, each of which is equipped with a specially designed recessed type sterilising unit.

The X-ray equipment (with Ilford viewing cabinets) was supplied by the General Radiological and Surgical Apparatus Co., Ltd., the dentists' appliances by the Dental Equipment Co., Ltd., and the sight-testing outfits by Theo. Hamblin, Ltd. The

cables used are of Pirelli (armoured) and Macintosh makes, with "J. & P." cable boxes, and G.E.C. conduit, switchgear, motor-generator sets, ward and staff signals, and fire alarms (with Watford contactors, fusible links by Associated Fire Alarms, Ltd., and valves by the Magnetic Valve Co., Ltd.).

The internal telephones are of the Automatic Electric Co.'s make. Refrigerators are by J. & E. Hall, Ltd., and the Pressed Steel Co. of Great Britain, Ltd.

The motors are of B.T.-H. make, the sewage pump by the Pulsometer Co., water float gear and clocks by Gent & Co., Ltd., while the electrically operated oil-firing equipment is by Ray Oil Burner Products, the electric fires used being of the Ferranti and Osler and Faraday types.

The electrical installation includes a 400-Ah capacity Chloride battery of 116 cells. This is used as a floating battery in the d.c. supply for emergency lighting.

"Osram" and "Cosmos" lamps are used with Troughton & Young lighting fittings, the suspension gear for the large entrance hall fitting being by the London Electric Firm. The electrical installation contractors were T. Clarke & Co., Ltd. The architects were Sir John Burnet, Tait & Lorne, and the consulting engineer was Mr. J. Stinton Jones, M.I.E.E.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The R. H. Tree Testimonial Fund

I have the pleasure to report that 487 members have subscribed the total sum of £335 12s. for the testimonial to Mr. Tree. Thanks to some special donations from a few old friends towards expenses, it has been possible for the Committee to present a cheque for 300 guineas to Mr. Tree and a silver tea set to Mrs. Tree. The tea set with a suitable inscription will be presented to Mr. Tree by the President of the Institution at the first meeting of the new session on October 26th.

The subscribers are indebted to the Council, to Mr. Rowell, and to Mr. Rayner for much kind assistance to the Committee and to me.

ARTHUR PREECE,
Hon. Treasurer.

London, W.C.2, *July 17th.*

At the I.E.E. Overseas Conversazione (See page 103)

1. Professor and Mrs. W. G. P. Wall (Naini Tal, India), Mrs. and Mr. A. Monkhouse (Moscow), and Mr. W. Bull (Lahore). 2. Mr. F. W. H. Wheadon (Adelaide), Mr. G. L. Agar (Wellington, N.Z), and Mrs. and Mr. H. E. S. De Kretser (Colombo). 3. Mr. O. M. Meares (Cawnpore), Mr. P. G. Moore (Cawnpore), Mr. S. W. Redclift (Calcutta), and Mr. D. E. S. Jackson (Calcutta). 4. Mr. E. C. Barton (Watford), Miss Acutt, Mr. M. L. Gillespie (Durban), Mrs. and Mr. C. R. Halle (South Africa), and Mr. M. A. Byford (Christchurch, N.Z.)

Electricity in Fencing

The reference to electricity in connection with fencing in the July 7th issue of the REVIEW rather conveys the impression that it is a new thing. Some forty years back when in business with my father, Mr. W. Groves, of Bolsover Street, W., we made to the instructions given by Dr. Little, of the Orthopædic Hospital, Great Portland Street, W., two sets of fencing equipment which registered electrically when a straight thrust was made. Electrical contact was made in the handle of the foil when the blade was forced inwards, and the circuit was completed by contact with the opponent's jacket which had a brass gauze covering. Leclanché cells, flexible wire, a counterweight, and an electric bell and two indicators on the wall completed the equipment. I erected this at Messrs. Bertrand's Fencing Academy, Warwick Street, W., where it was put into service and answered admirably.

A. GROVES.

Watford, *July 12th.*

Costing Bulk Supplies

I have sometimes thought that I was a "two-part" enthusiast but Mr. Petersen certainly leaves me standing. In fact, his article under the above head might almost be called the

reductio ad absurdum of the two-part tariff. He has constructed a tariff with a fixed charge of no less than £17 8s. per annum per kW merely to cover the bare costs of supply, and has developed a curve showing its effect at different load factors. After all this it is a positive relief to hear that he "does not suggest that the 1 per cent. load factor consumer should be charged 47.9d. per kWh plus a margin of profit," although there is no logical reason (if Mr. Petersen's arguments are correct) why he should not.

Such a tariff can be attacked on two grounds—practical and theoretical. It is unpractical because it would not attract consumers and because it is entirely out of line with current British practice. Taking the numerical ratio between the cost per annum per kW (in £) and the cost per kWh (in pence) the average ratio for the power tariffs in this country is about 13: Mr. Petersen's tariff has a ratio of 78.5. So great a discrepancy between the proposed and the normal would suggest that there must be something wrong with one or the other.

But the theory is mistaken as well as the practice. Instead of diversity factor being "allowed to take care of itself" it has, in fact, been omitted entirely from Mr. Petersen's figures, since the transmission loss has been taken as the same in kW as it is in kWh. Moreover, the article misses the essential point that diversity factor is not a static "lump sum" figure to be applied to the system as a whole but is inversely related to load factor. Our 1 per cent. load-factor consumer will escape his four shillings per kWh, not (as is suggested) because there is an Act of Parliament to prevent it, but because it is not economically justified even if it were legal and politic. If there are twenty such consumers will they make twenty times as much demand on the system as a single high-load factor consumer with the same m.d.? Manifestly they will *not*—and in fact the lower the individual's load factor, other things being equal, the higher will be his diversity factor (though not, of course, in the same ratio).

The only way of fitting these human facts into the iron law of the two-part tariff is to alter the ratio of the two parts. The fixed charge must first be lowered to allow for average diversity, and then the two parts must be adjusted to take account of differential diversity. D. J. BOLTON.

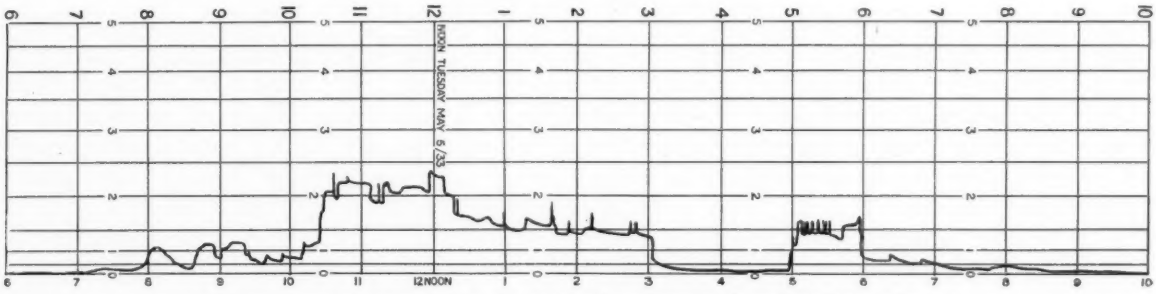
London, W., *July 14th.*

Earthing—Solid or Artificial?

We have recently been hearing, and reading, a lot about the unsatisfactory protection provided by solid earthing. Mr. Gilbert advocates what he calls "artificial earthing," but it is not very clear, to me, how this differs from the ordinary earth leakage protection with which we are all familiar.

Even if we admit the "snags" associated with solid earthing, I think we should be very careful before we adopt an alternative depending on the correct functioning of a delicate earth leakage relay. F. P. PHILLIPS, B.Sc.

Lincoln, *July 11th.*



The load curve of one phase in an all-electric resturant at Manchester (See page 75)

Trade or Technics?

Your editorial note in the current issue of the ELECTRICAL REVIEW referring to the absence of papers dealing with the contractors' trading policy, at their recent conference, is most opportune, as without them the conferences lose a good deal of their value. I for one did not attend to hear the papers read thinking them more suitable for an Institution meeting than a business conference. M.I.E.E.

July 15th.

The Benson Boiler

THE Benson boiler has reached another stage of development. According to Messrs. Siemens-Schuckertwerke, Berlin, tube failures occurred due to hot-spots caused by the deposition of salts from the feed water at certain parts of the heating surface, which is roughly the zone of conversion of water into steam.

When boilers in which the conversion zone was originally exposed to radiant heat were rebuilt in such a way as to shift the conversion zone to lower flue-gas temperatures, tube failures ceased entirely. The boiler on the steamer *Uckermark*, as well as that in the cable works installation at Berlin-Gartenfeld and the Langerbrugge boiler in Belgium, have given "most satisfactory" results since being rebuilt in the above manner. Similar remedies, and also methods of efficient blow-down, have enabled Benson boilers to be operated safely much below the critical pressure. The chief advantage of this is that no excess feed pump work is required.

The Ediswan Girls at the Advertising Exhibition, Olympia

The first trials of operation at under critical pressures were made by Professor E. Josse, of the Technische Hochschule, Berlin. Later, Messrs. Siemens-Schuckertwerke operated their large (40 tons per hour) boiler No. II at the cable works, Berlin-Gartenfeld, below the critical pressure, and recently the boiler on the *Uckermark* (20 tons per hour) has worked at 1,000 lb., which is little above the turbine pressure to which formerly the steam had to be throttled down. The Langerbrugge boiler (135 tons per hour) is still operating at the critical pressure, because in this plant the high pressure is fully utilised in a turbine.

Based on this fact, Messrs. Siemens-Schuckertwerke have developed a new method of operating the turbine at the maximum pressure at maximum load, letting the pressure adjust itself automatically at partial loads. This is done by the omission of the throttle valve at the turbine inlet and by adjusting the boiler output directly in proportion to the turbine load. The turbine construction thus becomes much simpler and the feed pump has not to work against higher pressures than just necessary. A detailed project has been worked out for a peak-load station with 500 lb. normal and 2,000 lb. peak pressures, giving a turbine output from 5,000 to 20,000 kW. The operating advantages are claimed to be material and the first costs related to maximum capacity surprisingly low.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

An Electrically Operated Fountain

An interesting new product of MESSRS. H. LONGTON & Co., Josephs Road, Guildford, is a self-contained electrically operated garden fountain priced at £9 10s.

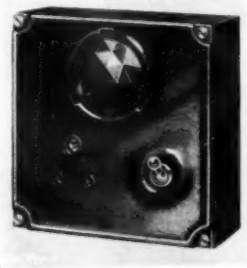
It is made of wood, covered with a layer of cement on expanded metal, the whole rough cast giving the appearance of solid concrete. The bath is octagonal in shape, 4 ft. 6 in. wide by 3 in. deep, and lined with lead, making it thoroughly watertight.

The electric pump, which is housed in the pedestal and driven by a 1/30-h.p. motor, has a capacity of 190-200 gal. per minute, against a head of 10 ft.

An " electric " fountain

Indicating Control Units

MESSRS. J. H. TUCKER & Co., LTD., King's Road, Tyseley, Birmingham, 11, are now producing " Telac " control units for such apparatus as irons, water-heaters, and tubular heaters.



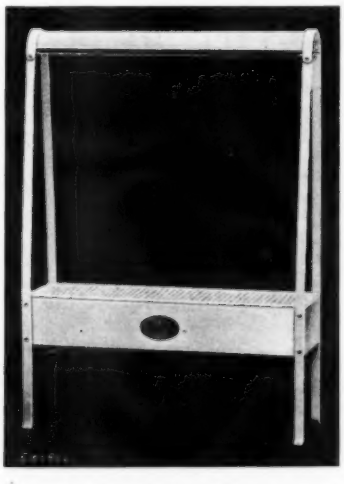
A 5-A " Telac " indicating control unit

Each consists of a black-enamelled iron box equipped with a tumbler switch controlling a three-pin standard gauge socket (optional), a b.c. pigmy lamp-holder for a pilot lamp, and an amber-coloured lens for tell-tale service. The case has at the bottom one hole tapped for ¾-in. conduit.

Two sizes are available in both surface and flush patterns, with or without the socket. A 5-A surface box without a socket measures 3¼ in. by 6¼ in. by 2¼ in., and costs 5s. 4d., while a 15-A flush model with a socket measures 6¼ in. by 6¼ in. with a ½-in. projection, and costs 24s.

An Arora Towel Horse

A new development by the ARORA CO., Loughborough, is an electric towel horse priced at 30s. It is fitted with a 950-W heater and is finished in white enamel, the top towel support being of polished aluminium.



The Arora towel horse

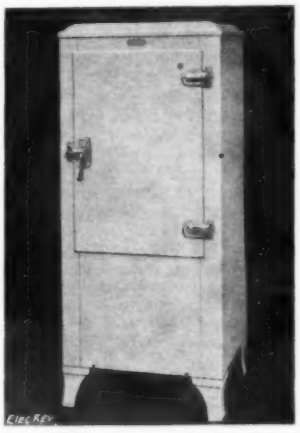
The protected porcelain terminal block in the base is provided with an earthing connection and the size is 24 in. wide by 33 in. high by 8 in. deep. The weight is 11 lb.

Socket Improvements

The " Flexitube " self-aligning and self-locating socket introduced by MESSRS. J. H. TUCKER & Co., LTD., King's Road, Tyseley, Birmingham, at the last British Industries Fair is now being standardised for use with all sockets produced by the company. It consists of the socket tube proper in two separate pieces surrounded by a spring collar down its entire length. The collar is anchored to the tube, and the socket is self-aligning within the high and low B.S.S. plug limits, with maximum contact ensured on tapered or worn plugs.

Domestic Refrigerators

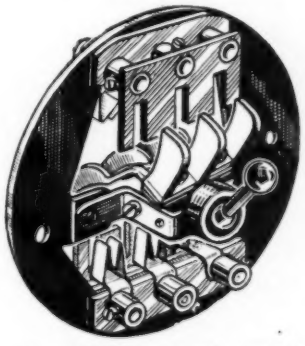
Two new domestic refrigerators have been produced by MOFFATS, LTD., Blackburn. Model " M.4 " has a storage capacity of 4.5 cu. ft. and a shelf area of 8.8 sq. ft. The exterior dimensions are 56¾ in. by 24¾ in. by 23¼ in. overall. There are two freezing trays and the interior and exterior are of porcelain enamel and light ivory or white baked " Porcelite." The larger model, " M.6," has 6 cu. ft. of storage space and 10.4 sq. ft. of shelf area. The overall dimensions are 61¾ in. by 28¾ in. by 25 in., and there are three freezing trays. Similar finishes to those of the smaller model are provided. Features common to both equipments are that the freezing element is self-defrosting, and the compressor unit is hermetically sealed in oil and has only two moving parts. The specially designed chamber permits the proper circulation of humidified air, while a cold control unit affords nine different freezing speeds.



A new Moffat refrigerator

A " Tripolit " Tumbler Switch

The accompanying sketch shows a new pattern of the " Tripolit " triple-pole tumbler switch which MESSRS. A. P. LUNDBERG & SONS, LTD., 477, Liverpool Road, Holloway, N.7, have just sent us. It is intended for flush mounting or fixing directly on to motors, &c., and consists of a switch movement, terminals and contact springs fitted on a circular rust-proof steel fixing frame three inches in diameter. The switch has a rating of 5 A at 250 V d.c., and can be used satisfactorily for a.c. three-phase motor control. The same method of construction is being applied to the " Twinob " double-pole a.c. motor-starting, double-pole change-over, series-parallel and reversing types of switch, the last three being obtainable with an " off " position.

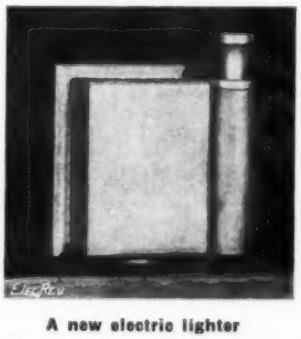


The " Tripolit " tumbler switch

A new pattern of " Tripolit " triple-pole switch-plug is also available, and is of the watertight non-interlocking pattern arranged with a turn type method of control, and fitted with a watertight 3-pin and earth plug, the whole having a rating of 5 A at 250 V d.c.

A Cigarette Lighter

A patent electric cigarette lighter has been introduced by the MODERN ELECTRIC APPLIANCE Co., 33, Grafton Street, London, W. It is of the wall type and measures 4 in. by 3 in. by 2 in. The actual ignition movement is contained within an insulated casing and comprises a series single coil magnet to which a movable contacting plate is pivoted and opposite to which an independent insulated bridge contact plate is fitted. Connection to the mains is made respectively to one end of the series-coil and the insulated bridge. When these two contact plates are momentarily bridged immediate ignition is effected by means of an intense spark.



A new electric lighter

The striker is normally accommodated within a movable fuel tube container shown at the side of the casing, and com-

prises a circular rod or holder made of high insulating material, which is fitted at one end with a small piece of metal tube containing a wick, which is moistened at the tip when inserted in the fuel tube.

To obtain a light the wick end of the striker lighter is inserted through the bushed inlet provided through the lower wall of the movement casing. Flame ignition is readily obtained and the lighter withdrawn ready for use.

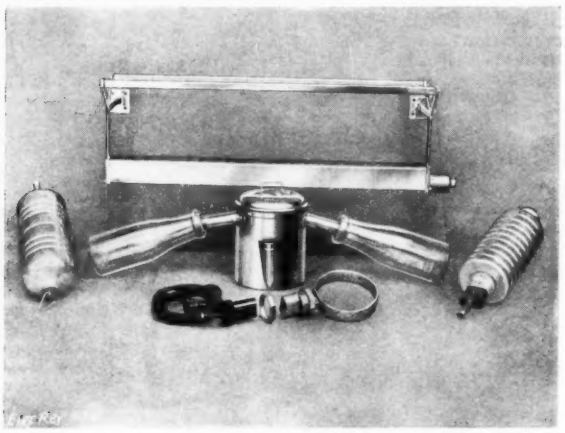
Models can also be supplied for solid fuel, and table models are made. A complete smoker's unit consisting of the patent ignition movement fitted in the base of an electric reading lamp standard carrying a striker, tube and a movable ash tray is also available.

A Variety of Domestic Appliances

Among a number of recent developments by MESSRS. GEORGE GREEN & Co., Chapel Road, West Norwood, S.E.27, is an immersion heater for use in an ordinary kettle. The element is of the circular blade type, but with a free blade end, so that the blade may be threaded through a hole in the kettle. The equipment is provided with lock nuts and packing washers, and is available in three loadings—1,000, 1,500, and 1,800 W, automatic or non-automatic. The smallest non-automatic equipment costs 8s. 6d., and the largest automatic one 14s.

Another "Gee-Gee" development is a towel airer constructed of brass and copper with chromium plating finish. The element is housed in a perforated container at the bottom, and the terminals, including one for earthing, are enclosed in a brass box provided with a cable gland. The apparatus measures 24 in. by 8 in., and is loaded at 100 W.

The company's recently introduced bed warmer consists of an aluminium bottle housing a suitable element, and com-



Some new "Gee-Gee" domestic appliances

plete with two-pin terminals, a connector, and two yards of flexible cable. When on circuit for about twenty minutes sufficient heat is generated and stored for many hours' output. It is loaded at 200 W, and is listed at 10s. 6d.

Another new appliance is an 8-in. diameter 50-W warming plate sold for 12s. 6d. Placed on the sideboard it affords a convenient and economical means of dish warming. It is constructed of polished aluminium, and is fitted with "Bakelite" feet and handles.

What is believed to be the smallest electric distiller made is a new automatic product of this company. It is loaded at 200 W, measures overall 7½ in. by 22 in. by 8½ in., and is sold complete with two glass receiving flasks and two yards of three-core flexible cable for 45s. The new "Gee-Gee" car radiator heater which is loaded at 75 W, and is listed at 10s. 6d., is of "hot-water bottle" construction, and has a hook for suspension under the car bonnet.

An Electric Grass-cutter

It is claimed by the makers of a new nine guinea grass-cutter, POWER SPECIALITIES, LTD., Viaduct Works, Slough, that 500 square yards of grass can be cut in an hour using less than 1 kWh of electricity. We recently examined the machine, known as the "Rotoscythe," and witnessed a demonstration, and it appeared to work very efficiently.

The ¼-h.p. motor, which is made by the company itself, is directly coupled to a rotor with four blades which revolves at about 6,000 r.p.m., cutting the grass with a scythe action. The rotating blades create a strong draught which draws the grass into an upright position ready for scything. The same current of air carries the cut grass into the detachable perforated steel basket.

Owing to the high speed at which the blades revolve they need not be very sharp; each blade has four edges which can be used in turn. The cutting diameter overlaps the wheel path so that the grass can be cut right up to the edges. The height of the cut may be adjusted by a horizontal wheel at the front of the machine (it is possible to adjust the cutting action so that the grass is cut almost level with the ground or over a foot high).

Three-core flex is supplied, the frame being earthed, and the weight is only 20 lb. The width of the cut is 10 in. Another model fitted with a ½-h.p. motor and weighing 20 lb., with a

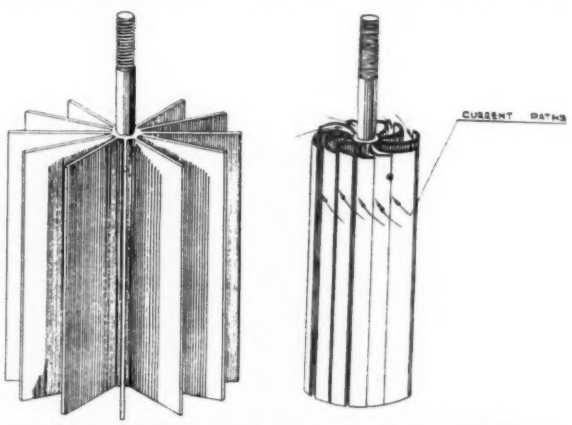
The "Rotoscythe" grass-cutter (inset: the rotary four-edged blades)

13-in. cutting width, costs £13 13s. The same company is also manufacturing a range of fractional h.p. motors for use in vacuum-cleaners, hair driers, &c.

New Electrolytic Condenser Design

The form of the wet electrolytic condenser has become more or less stereotyped. It consists of an aluminium vessel which contains the electrolyte, and constitutes the negative connection. Down the centre is fixed an aluminium rod to which is joined the positive electrode proper, a spiral coil of aluminium strip, usually about 0.01 in. thick. Although this form of positive electrode is suitable for cheap mass production, it has several disadvantages. The spiral, for instance, is rather flimsy and the individual turns tend to touch one another, in which case corrosion will occur; or the outside turn may touch the container, causing a short-circuit. Also, in joining the rod to the foil, if impurities are trapped in the joint, deterioration sets in, and the life of the condenser is much shortened.

It is evident that if the coiled strip and rod were made in one piece difficulties in jointing would be avoided; and also if the spiral were replaced by, say, straight strips radiating



Electrolytic condenser electrode as extruded and with arms bent round

from the centre, there would be no tendency for circumferential touching to occur. Attempts to make a one-piece radial-arm electrode by extrusion, however, failed because it was found impossible to produce the radial arms thin enough, and in sufficient number, to give the required area of surface in the limited space available.

An ingenious method of overcoming the difficulties involved is illustrated herewith. The electrode is shown as extruded; when the arms are coiled round as shown in the right-hand figure they fit into a much smaller space than the original. The method has been evolved by BRITISH INSULATED CABLES, LTD., Prescot, Lancs., and a patent has been applied for.

British Overseas Electrical Trade in June

WE reproduce below the Board of Trade returns relating to the June electrical exports and imports. It will be observed that although exports declined as compared with May, imports were higher. In both directions the figures were lower than in June last year. The decrease in exports was due to the smaller shipments of submarine cable and motors and generators. The increase in imports was spread over nearly all items. Proportionally the imports this year have fallen to a much greater extent than exports. Details of electrical machinery exports during June are given in our "Business Notes."

	Exports.			Imports.			Re-Exports.		
	Electrical exports for June, 1933.	Inc. or dec. as compared with May, 1933.	Inc. or dec. as compared with June, 1932.	Electrical imports for June, 1933.	Inc. or dec. as compared with May, 1933.	Inc. or dec. as compared with June, 1932.	Electrical re-exports for June, 1933.	Inc. or dec. as compared with May, 1933.	Inc. or dec. as compared with June, 1932.
Insulated wires and cables ...	£104,049	+ £7,822	+ £9,737	£15,338	— £1,972	— £3,838	£62	— £57	+ £14
Electric carbons	4,422	+ 917	+ 3,174	15,059	+ 4,152	+ 8,501	181	+ 161	+ 165
Arc lamps and searchlights ...	642	+ 186	— 198	153	+ 31	+ 104	110	+ 110	+ 110
Incandescent lamps	41,527	+ 4,073	+ 6,475	17,860	+ 2,265	+ 5,120	325	— 985	— 129
Other lighting apparatus ...	28,246	+ 6,139	+ 4,427	20,132	— 3,560	+ 6,161	1,071	— 2,874	+ 130
Batteries and accumulators ...	49,317	— 6,037	— 3,262	2,015	+ 273	— 8,086	85	— 31	— 1,569
Meters and instruments ...	18,870	— 3,130	— 3,028	21,600	+ 3,773	+ 180	203	+ 16	— 338
Unenumerated electrical goods and apparatus ...	92,990	— 5,510	+ 20,930	34,459	+ 855	— 6,736	1,863	— 1,171	— 73
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cables (not submarine)	28,694	+ 5,091	+ 6,392	152	+ 83	— 355	463	+ 463	+ 463
Submarine telegraph and telephone cables...	407	— 28,918	+ 407	—	—	—	—	—	—
Telegraph and telephone apparatus	186,100	— 12,107	+ 33,333	37,681	+ 6,405	— 6,281	1,989	— 52	— 1,433
Electrical Machinery—									
Railway and tramway motors	4,984	+ 2,039	— 5,097	—	—	—	—	—	—
Other motors and generators	87,573	— 33,966	— 4,836	—	—	—	—	—	—
Unenumerated electrical machinery	101,098	+ 8,199	— 135,576	20,203	— 782	— 6,004	3,487	+ 1,986	— 4,829
Total	£748,919	— £55,202	— £67,122	£184,652	+ £11,523	— £11,225	£9,842	— £2,434	— £7,189
Decreases for the first six months of the year ...	Exports. £297,210			Imports. £281,389			Re-Exports. £49,055		

The Indian Import Market

A SATISFACTORY feature of the recently published Department of Overseas survey of the import trade of India during the year ended March 31st is that, although the imports of electrical machinery from the United Kingdom declined from Rs.150 lakhs to Rs.121 lakhs, the continued decline in the share of this country in the total trade (Rs.156 lakhs, against Rs.216¼ lakhs in 1931-32) seems to have been checked. Electrical machinery imports from the United States were Rs.20 lakhs lower at Rs.16 lakhs.

A slight increase from Rs.223 lakhs to Rs.234 lakhs is recorded in the imports of electrical instruments, apparatus, appliances and parts (including telegraph and telephone apparatus), the United Kingdom's share advancing from Rs.115¼ lakhs to Rs.121½ lakhs, that of Germany from Rs.33 lakhs to Rs.34½ lakhs, Italy from Rs.5¼ lakhs to Rs.6 lakhs, and Japan from Rs.5¼ lakhs to Rs.17 lakhs. On the other hand, arrivals from the Netherlands fell from Rs.13 lakhs to Rs.11 lakhs, and those from the United States from Rs.30¼ lakhs to Rs.26½ lakhs.

Analysed by countries the trade in the various items embraced by the heading electrical instruments, apparatus, appliances, and parts was as follows :—

	1931-32. Rs. (lakhs.)	1932-33. Rs. (lakhs.)
Fans	19½	22½
From United Kingdom ...	10½	13
„ Italy	4	4½
Electric wires and cables	60½	59
From United Kingdom ...	43½	41
„ Germany	8½	6
„ Belgium	3	2
„ Japan	1	7
Telegraph and telephone apparatus	*	5½
From United Kingdom ...	*	4
Gas filled lamps	16	14½
From United Kingdom ...	7	8
„ Holland	4½	3½
Vacuum lamps	16	16½
From United Kingdom ...	5½	5½
„ Holland	5½	4½
„ Japan	2	3½

	1931-32. Rs. (lakhs.)	1932-33. Rs. (lakhs.)
Automobile lamps	*	1½
From Japan	*	1
„ Holland	*	½
Torch lamps	2½	3½
From Japan	½	1½
„ United States	½	1½
Batteries	11	13
From United Kingdom ...	2	3½
„ United States	7	7
Accumulators	8½	9
From United Kingdom ...	6	8
Elec. lighting fittings and accessories	*	7½
From Germany	*	3½
„ United Kingdom ...	*	2½

	1931-32. Rs. (lakhs.)	1932-33. Rs. (lakhs.)
Meters	6½	10
From United Kingdom ...	3½	5½
„ Germany	2	2½
Electro-medical apparatus ...	*	3½
From United States	*	1½
„ United Kingdom ...	*	½
Switchboards (practically all from United Kingdom)	*	2
Unenumerated goods and apparatus	40	51½
From United Kingdom ...	21½	21½
„ Germany	5½	7½
„ United States	10	8½

* Not stated.

Proposed Underground Railway for Rio

TRANSPORT developments are pending in Rio de Janeiro which will entirely revolutionise the means of communication of the capital city of Brazil. Tenders are to be invited for the construction of an extensive underground electric railway system which is in keeping with the general remodelling of the city which has been proceeding for some time.

The Interventor of the Rio de Janeiro Federal District has published a decree authorising the Directorate of Engineering to invite tenders for the construction and exploitation of a circular underground railway in the central zone of the city—which will eventually be extended to the suburbs—in response to the great mass of public opinion which has been demanding for many years that the solution of the problem of the ever-increasing volume of traffic in the area should be reached by the construction of a metropolitan railway. The enterprise will place Rio, as regards means of communication, on a level with the most advanced capitals of the world.

The definite transport system required by the vastness of the district and its extraordinary development has been clearly explained in the report prepared by the architect, but this cannot be executed all at once because there is no means of obtaining the capital necessary to establish the whole network to connect the centre of the city with all its suburbs. Consequently, the present decree divides the scheme into two stages, the first being intended to cope with the central traffic congested area, leaving for a future opportunity the construction of the subsidiary lines. Similar procedure has been adopted by other cities in Europe and America which now possess this means of transport, so that the scheme as outlined is claimed to be reasonable.

Under the decree, which was signed on June 14th, the Directorate of Engineering is authorised to invite tenders within six months for the construction and exploitation of an underground circular electric railway for the central zone of the city, the principal station of which will be in the Praça da Bandeira from which centre the lines will radiate. In addition to the chief station there will be twelve other stations. At a later date further lines will be constructed, starting from the Praça da Bandeira, as may be required by the suburbs.

The tenders received are to be considered by a commission under the chairmanship of the General Director of Engineering, and appointed by the Government Representative. The tenders must be submitted in accordance with the stipulated conditions.

It is important to point out to interested firms that a strict exchange control exists in Brazil, whereby return remittances of sterling to this country may be difficult to obtain. This is a risk which must be safeguarded against in any contracts entered into with the Brazilian authorities.

In the Courts

IN the Chancery Division on July 14th Mr. Justice Farwell again had before him the motion by Harlie, Ltd., wireless manufacturers, against Elcordon, Ltd., Cosmocord, Ltd., and others. It was stated at a previous hearing that the plaintiffs claimed an interlocutory injunction to restrain the defendants from doing acts in breach of an agreement under which plaintiffs were appointed sole agents for the sale of defendants' goods.

Mr. Gover, K.C., for the plaintiffs, now said that a temporary arrangement had been arrived at between the parties, and the terms would be signed by counsel. Undertakings had been given by both sides.

His Lordship said that if both parties treated each other fairly the arrangement should keep matters stable until the action was tried. The motion accordingly stood over, no order being made except that the costs be costs in the action.

A Passing-off Action

On July 14th in the Chancery Division Mr. Justice Eve had before him a motion on behalf of the Westinghouse Brake & Saxby Signal Co., Ltd., against the Premier Supply Stores, Clapham, S.W.

The plaintiffs asked for an injunction restraining the defendants from passing off as and for rectifiers of the plaintiffs' manufacture rectifiers not of their make; and from selling or advertising as Westinghouse rectifiers any article which, while containing the whole or part of the plaintiffs' manufacture, differed in quality, specification or construction from the rectifiers sold by the plaintiffs under the name "Westinghouse rectifiers."

Mr. Kenneth Swan, for the plaintiffs, said they had put on the market an electrical rectifier which was used for transforming alternating current. The article was much used for radio purposes and for charging accumulators. An advertisement put by the defendants in *The Wireless World* offering accumulator chargers "incorporating the Westinghouse rectifier" was brought to the plaintiffs' notice and they found that the workmanship of the article was inferior. It was an apparatus which if used in the way the specification suggested would be a danger to the public.

Mr. F. Hallis, for the defendants, did not dispute that there had been the breach complained of. The case for the defendants was that they were innocent offenders because had they been requested to stop manufacturing these articles they would have done so. Since May last they had not advertised them. He now offered to give an undertaking in the terms of the writ and was willing to do anything reasonable which plaintiffs required in order to put the matter right.

His Lordship granted the injunction as asked, and ordered the defendants to pay the costs of the motion.

Interference with a Meter

Before the Stipendiary at Wolverhampton Police Court on July 12th Francis J. T. Fellows, Wolverhampton, was summoned for wilfully preventing a meter from registering electricity passing through it

Mr. H. W. Heelor, who prosecuted, explained that a meter inspector discovered that a piece of wire had been connected from the Corporation fuses to the consumer's fuses in the meter equipment of the house, and one set of fuses had been pulled out so that no current was passing through the meter. When the defendant was asked for an explanation he said that on the previous night he could not get a light to switch on, and so he tried fixing a wire as stated. This brought the light on when he pulled a set of the fuses out. He did not realise that there was no current passing through the meter. A model of the equipment was produced in court to explain the matter to the Stipendiary. The latter, in imposing a fine of £4, said he was not satisfied with defendant's explanation.

Parliamentary News

(BY OUR SPECIAL REPORTER)

IN the House of Commons last week Mr. Gledhill asked the Postmaster-General how many complaints had been received during the last five years of interference with broadcast reception arising from tramways, trolley-buses, or other electrical plant and apparatus.

Sir K. Wood said that no complete record of the number of complaints of electrical interference with broadcast reception was available before October, 1931. During the six months ended March 31st, 1932, the number of such complaints was 7,114; and during the twelve months ended March 31st, 1933, there were 20,624 complaints.

Mr. Gledhill asked the Postmaster-General if he would state the total amount spent during the past five years by his department upon research into remedial measures against interference with broadcast reception.

Sir K. Wood said that the total cost to the Post Office of engineering work in connection with broadcasting during the last five financial years was as follows: 1928-29, £12,245; 1929-30, £16,498; 1930-31, £23,103; 1931-32, £33,441; and 1932-33, £51,000 (approximate). It was not practicable to subdivide these amounts, but the expenditure was mainly incurred in the treatment of complaints of electrical interference with broadcast reception, including the research work which had been necessary to find remedies.

Oil from Coal

On July 17th Sir A. Baillie asked the Prime Minister whether the Government had reached a decision on the question of State assistance for the production of petrol from coal.

Mr. MacDonald said that the Government had decided to give effect to a proposal which they had reason to believe would ensure an immediate advance in the manufacture of home-produced motor spirit. The proposal would take the form of a guaranteed preference at the rate of 4d. a gallon in respect of light hydrocarbon oils, as defined in the Finance Act, 1928, manufactured in this country from indigenous coal, shale or peat, or from products derived from these substances. The guarantee would be for a period of ten years from April 1st, 1934, provided that if the Customs duty for any financial year after March 31st, 1935, exceeded 4d. a gallon and no Excise duty was imposed for that year, or if for any year the Customs duty exceeded any Excise duty by more than 4d. a gallon, then in respect of each such year the period of guarantee would be reduced by three months for each penny in excess. The effect of this arrangement was to vary the period of the guarantee according to the actual preference, *i.e.*, the difference between the Customs duty and the Excise, if any Excise duty should be imposed. Legislation to give effect to the guarantee would be introduced in the autumn.

Mr. MacDonald added that the proposal would mean that about 7,000 men would be directly employed, and a slightly lower number indirectly. The particular plant which the Government had in mind would be capable of producing about 100,000 tons of petrol, or, roughly, 30,000,000 gallons a year, and would consume 350,000 tons of coal a year, giving employment to more than 1,000 miners. The cost to the Treasury would be very small.

The Electricity (Supply) Bill

This Bill was further considered on July 13th by a Select Committee of the House of Lords under the chairmanship of Lord Onslow. Redrafted clauses to conform to decisions come to at previous sittings were approved by the Committee and the Bill as amended was ordered to be reported to the House.

Investigating Insulating Properties

A SIGNIFICANT contribution to the problem of explaining the reasons for insulating properties in certain substances was made at a recent joint meeting of the Manchester Sections of the Institution of the Rubber Industry, the Society of Chemical Industry, and the Plastics Group of the latter Society, in a paper read by Mr. W. H. Nuttall, F.I.C. The author pointed out that the conduction current present in an insulating material must be regarded as being ionic in character, and this implied that, for many commercial dielectrics of an organic (chemically speaking) nature, such a current denoted the presence of impurities. The purity of ebonite might be improved by either removing the protein matter from rubber latex before manufacture into ebonite or by incorporating up to 10 per cent. of absorbent carbon black with the ebonite; but few other dielectrics could be purified so simply. The initial large current which occurred on subjecting a dielectric to stress was due to the presence of induced or natural dipoles (an account of which was given in the ELECTRICAL REVIEW of January 20th, 1933, page 77). The effect of these might be reduced, or even nullified, by using the insulator under conditions by which it was made as hard and as dense as possible.

The question which the author had set himself was whether some definite correlation could be established between the hardness of a solid dielectric and the viscosity of a liquid and their electrical properties. Working with transformer oils, the results were not definitive, perhaps by reason of the varying effects of viscosity upon impurities, but an investigation of linseed oil produced more hopeful results. Examination of varnished cloth (using stand oils) was somewhat obscured by acidity, but there seemed to be reason to suppose that some correlation between the degree of heat-conditioning and the electrical characteristics of the varnish existed. Then followed a consideration of the effects of incorporating ingredients with rubber to produce hardness, density, and tensile strength, and finally a discussion of the effect of the technique of manufacture upon the electrical insulating properties of synthetic resins, wherein the author referred to the superiority of phenolic resins over those made from commercial cresol. His opinion was that the greater degree of softness imparted by cresol accounted largely for its reduced value as an insulator. Experiments with glyphtal resins, designed to demonstrate this contention, became subject to the effects of acidity, and no reliance, unfortunately, could be placed in them. The paper is reproduced in the *Transactions* of the I.R.I., Vol. VIII, No. 6.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The "Electrical Review" Index

The Index to Vol. CXII (for the half-year ended June 30th, 1933) will be published shortly. Readers who require it (free of charge) for binding purposes, or wish to retain it for reference, should apply to the Publisher, Dorset House, Stamford Street, S.E.1.

Lighting Service Bureau Touring Demonstration

The illustration accompanying this note shows a general view of the touring demonstration of the Lighting Service Bureau which was at Torquay recently. It will be noticed that the colorama represents an important part of the demonstrations. Another feature is a model building which can be floodlighted in twelve different ways, while the demonstration also includes an excellent arrangement for grouping fittings which the Bureau is using to demonstrate domestic lighting.

Fordingbridge, Bishops Waltham, and Ringwood have already been visited, and a full itinerary is planned for the autumn months. The demonstrations at Fordingbridge were especially interesting as the West Hampshire Co. only provided a supply of electricity in the district during September last. The demonstrations were well attended, and the supply company co-operated by floodlighting the church at one end of the main street and giving a street lighting demonstration in the centre, while the Lighting Service Bureau vehicle floodlighted the lecture hall.

A general view of the Lighting Service Bureau demonstration

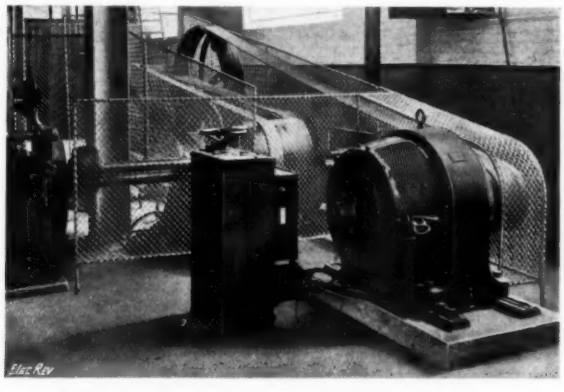
The Oil Industries Exhibition

At the International Oil Industries Exhibition, which is being held at the Royal Agricultural Hall, Islington (July 19th-25th), Messrs. Babcock & Wilcox, Ltd., display samples of work done with their process of fusion welding which makes it possible to deposit weld metal free from porosity and slag inclusions, and thus of high specific gravity, its physical properties and chemical analysis being similar to those of the parent metal itself. These conditions are obtained by control of the arc, thus avoiding the deposit of metal in the "wild" state, and by shielding the arc and molten metal from contamination. The B. & W. process embodies specially developed radiographic inspection of all weld metal deposited, and pressure vessels are stress relieved by heat treatment. The specimens on view include a length of fusion welded penstock pipe for 1,000 lb. per sq. in. pressure.

Among oil-firing exhibits are a combined pumping, heating, and filtering unit, together with a number of burners. Miscellaneous items include an 8-in. parallel slide valve to which is connected a Babcock-Tate electrically operated valve control. The Calorizing Corporation of Great Britain, Ltd., a subsidiary, illustrates the uses of the calorizing process for the prevention of corrosion and oxidation, and the advantages of "Calmet" high-temperature alloy tube supports.

Safety in Factories and Workshops

Although factory owners are legally bound to make proper provision against accidents, mishaps do still occur, more often than not because the most efficient type of machinery guard is not employed. For all kinds of machinery, belts or pulleys,



A good example of machine guarding

guards of strong wire mesh on stout steel rod frames are most satisfactory and they are equally effective when applied to actual machine operation, having an outstanding advantage over the solid type of guard in that they enable the operator to see the work. The picture above is one of several sent us by Messrs. G. A. Harvey & Co. (London), Ltd., depicting wire mesh guards of various patterns made by them. In special circumstances, such as where the extreme limit of security is required or where a smarter appearance is desired, an alternative material for the guards is provided by perforated steel, copper or brass.

Electrical Machinery Exports in June

The Board of Trade returns for June show that the total value of electrical machinery exported during the month was £193,655, as compared with £339,164 in June last year. We analyse this total below according to destination. Our monthly table relating to Great Britain's overseas electrical trade in June appears on page 91.

	Quantities.		Values.	
	June, 1933.	Inc. or dec. as compared with June, 1932.	June, 1933.	Inc. or dec. as compared with June, 1932.
	Tons.	Tons.	£	£
European countries	159	— 609	36,665	— 88,164
Japan	2	— 6	636	— 734
South America...	67	— 32	11,924	— 6,628
South and South-West Africa	240	— 205	30,248	— 17,053
British India	268	— 99	36,196	— 28,734
Australia	94	+ 64	14,846	+ 9,318
New Zealand	30	— 13	3,700	— 3,487
Canada	66	+ 11	11,477	+ 3,304
Other countries	414	+ 36	47,963	— 13,331
Totals	1,340	— 853	£193,655	—£145,509

The outstanding feature of these figures is the increase in the volume of exports to European countries coupled with a fall in value. The Australian trade seems to be reviving and the increase in shipments to Canada was satisfactory.

Conditions in Sweden

The June issue of the *Swedish Economic Bulletin* states that at the beginning of the year economic conditions in Sweden underwent some further deterioration and unemployment increased. Nevertheless exports of electrical machinery during January-April valued at 5,033,000 kr. showed an increase of 694,000 kr. as compared with the corresponding period of 1932, though telephone and telegraph apparatus exports declined from 1,876,000 to 1,334,000 kr.

Scientific Management

Arrangements have been entered upon for holding the sixth International Congress for Scientific Management in London during 1935. A preliminary meeting was held at the end of May this year, and Sir George Beharrell, chairman of the Congress, has now been notified that H.R.H. the Prince of Wales has consented to act as patron of the Congress. Although the actual date has not been definitely fixed, the British Organising Committee announces that it will probably take place early in July, 1935.

British Trade with Austria

An address on this subject will be delivered to members of the London Chamber of Commerce by His Excellency Herr Georg Franckenstein (the Austrian Minister in London) on July 25th in the Council Room of the Chamber, and Viscount Leverhulme, president, will preside. Dr. Schueller, Economic Adviser to the Austrian Government, will also speak.

"Castle" Contacts

With the advent of increased tariffs on foreign-made contacts last year the Castle Fuse & Engineering Co., Ltd.,

33, Chester Street, Liverpool, decided to commence manufacture of these components. We are informed that a large range of contacts for use in radio construction are now in production. The range includes all types of wander plugs in various colours, spade, hook and eyelet type battery terminals with coloured insulated sleeves, lettered if required, and red and black pin terminals. Lead-in tubes are also being made.

Annual Holidays

The Trafford Park and Attercliffe works of the Metropolitan-Vickers Electrical Co., Ltd., will be closed from July 28th until August 8th.

Messrs. Everett, Edgcumbe & Co., Ltd., are closing their works from August 5th to August 12th.

An E.D.A. refrigerator window display

The offices of the Magnetic Valve Co., Ltd., will be closed from August 4th until August 14th. A small staff will be available from August 9th to deal with emergencies.

Trade Announcements

Charles H. Ward (Electrical), Ltd., electrical engineers and contractors, of Manchester Road, Heaton Chapel, have opened additional premises at 140, Buxton Road, Stockport.

The Holland House Electrical Co., Ltd., is opening a showroom and store at 6, Chapel Street, Dumfries, early in August.

The Advertising Exhibition

This week the very well arranged exhibition by national advertisers, publishers of advertising media, and advertisement practitioners, is being held at Olympia and, as in every exhibition, electricity is playing an important part. The examples of illumination which are to be seen are too many to mention in detail but note may be made of several individual exhibits. Neon and other gas-discharge luminous tubing is a potent force in modern advertising and good examples of this class of work are to be seen on the stands of Franco Signs, Boro Electric Signs, Neon Manufacturers, Ltd., and Dobrulux, Ltd.; the last shows the new gas-discharge lamp made by Messrs. Siemens Bros. and Co., Ltd. Some of the exhibits are illustrated on page 102. The General Post Office advertises the telephone, telegraph and postal services on an attractive stand. The General Electric Co., Ltd., has furnished a special demonstration van for the occasion and the Edison Swan Electric Co., Ltd., has a troupe of pretty girls advertising its domestic appliances (see page 88). On the North Lancashire stand Siemens electric lamp works, Preston, is represented by a miniature display of the Popular-Pair kiddies in fancy dress, together with actual specimens of Siemens pearl and opal lamps.

Markets for Radio Apparatus

The Department of Overseas Trade has published a report furnished by H.M. Consul at Montevideo on the radio trade in Uruguay. This states that the main business is in receiving sets. As there is little home construction, components are imported in small quantities as spare parts for replacements only. United Kingdom and other manufacturing countries are faced with what amounts to a monopoly of the local market by United States manufacturers, who supplied 86 per cent. of the sets imported in 1931. There has hitherto been one chief reason for the small sales of United Kingdom radio sets, namely, that they were not selective enough. The city of Montevideo has some twenty stations and selectivity is therefore important. Recent developments in sets of United Kingdom manufacture, more especially on lines of greater selectivity, should enable them to secure a greater share in the market, provided that the prices are sufficiently competitive.

The Commercial Secretary to H.M. Legation at Athens in reporting on the market for radio apparatus in Greece, states that as that country has no broadcasting station short-wave sets for long-distance reception are the most suitable. The total number of complete sets imported during 1932 was 1,047, of which Great Britain's share was forty. Although United Kingdom prices are considerably higher than those of most competitors, British receivers are increasing in popularity, and there is no reason why manufacturers should not improve their position if prices could be made more competitive or if cheaper sets were to be introduced through the right channel.

E.D.A. August Programme

Summer time affords opportunities for selling fans and refrigerators and the August programme of the British Electrical Development Association contains illustrations of two seasonal window displays for July and August. The refrigerator display shown in the accompanying illustration has been designed so that the electrical dealer who is unable to install the actual refrigerator can make use of a plywood facsimile cut-out. The other display makes a special feature of electric fans, which with the E.D.A. "Modernised Men" form an attractive window. Reference is made in the programme to the water heating and cooking campaigns, and special attention is drawn to the box sign, particulars of which appeared in the July programme. The usual price list of literature available is included.

The Cottages in the Strand

The Building Centre prize-winning cottages erected on the Aldwych site in the Strand, one of which is all-electric, have been visited by over 10,000 people, and a general census of opinions has been taken. A number of criticisms were received, and as a result various alterations have been made in the cottages to meet the suggestions for improvement. These have been carried out in one of the cottages so that a comparison can be made between the cottage originally designed by the architect and the one altered according to the suggestions made by lay members of the public. The cottages in the altered state will remain open to view until the end of August.

For Sale

Horsham Urban District Council has for disposal old pumping plant at the waterworks pumping station. (See our classified advertisements.)

Changes of Name

Gilbert Productions, Ltd., has changed its name to Chesterton, Jones & Co., Ltd., and the Improved Wilson Microphone & Electrical Co., Ltd., is now known as R. C. and Wilson Electric, Ltd.

Electrical Propaganda in Wells Pageant

At the annual Wells Dressing Pageant held recently, the Buxton Corporation Electricity Department entered a decorated lorry in the non-competitive trade class. The lorry was divided into cubicles, each of which was set out with different domestic electrical appliances showing refrigerators, cookers,

A Buxton Electricity Department display

fires, small utility appliances, water heaters, and washing machines. The appropriate slogans, "Use Electricity All Ways," and "Electrify and Satisfy," were prominently displayed, while a weather-vane was mounted on top of the vehicle. The accompanying illustration conveys some idea of the attractive arrangement of the cubicles.

Electro-farming in Scandinavia

A deputation appointed by the Harrogate Corporation to investigate the use of electricity on the farms in Denmark and Sweden recently returned. Captain Mollett, one of the deputation, stated that in the chief farming districts of Sweden and Denmark 95 per cent. of the farmers were using electricity

for lighting and power, the all-in charge working out at approximately 1¼d. per kWh.

Catalogues Required

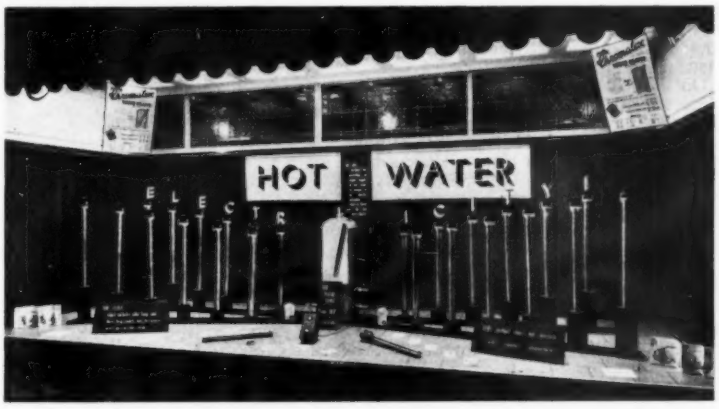
Mrs. N. Dyson Rayner, Perrymead, Prestwich, Manchester, asks for catalogues from manufacturers of domestic electrical appliances.

The Mexican Electrical Market

The Department of Overseas Trade has issued a report on the market for electrical machinery and apparatus in Mexico.

A Water Heater Display

That water heaters can be arranged to form an effective window display is evident from the accompanying illustration of one of the windows of the Leeds Corporation Electricity Department, which shows a collection of "Chromalox" circulator water heaters made by Geo. Bray & Co., Ltd. The display aroused a considerable amount of local interest.



An effective arrangement of "Chromalox" circulator water heaters

The Electrical Trade of the Netherlands

A report by Mr. R. V. Laming, C.B.E., Commercial Secretary to H.M. Legation, The Hague, to the Department of Overseas Trade (Stationery Office, 3s. 6d. net), reviews the economic conditions in the Netherlands during 1932. It states that British trade with Holland has not been as greatly reduced as that of certain competitors. The total imports fell 33 per cent. in value, while British imports showed a reduction of 26 per cent. In dealing with the imports of electrical materials the report states that while the total imports of electric generators fell from 1,100 to 200 tons, it is apparent from the figures for British imports, which declined from 430 to 16 tons, that prices were insufficiently competitive. The total imports of radio instruments decreased by over 600 tons, or more than 30 per cent., whereas those from the United Kingdom fell by 50 tons or less than 20 per cent. Although the total tonnage of electrical instruments, &c., imported showed a decrease of 500 tons, or about 10 per cent., the British imports actually showed an increase of over 200 tons. The total imports of boilers have risen by nearly 1,200 tons, and this increase is entirely taken up by British imports. A reduction is shown in the imports of insulated copper wire from 15,400 to 9,100 tons, but the very small British share was hardly affected.

Dealing with the transport and communications facilities, Mr. Laming states that though the electrification of the main line from Amsterdam southward is to be extended from Rotterdam to Dordrecht, further electrification seems for the present to be abandoned in favour of Diesel-electric traction on the sections from the three largest cities to the central junction at Utrecht.

Recent Contracts

The contract for the supply and installation of automatic colour light signalling on the L. & N.E.R., from Hackney Downs to Seven Sisters Junction, has been placed with the Westinghouse Brake & Saxby Signal Co., Ltd. The signals will be of the searchlight type, with a.c. track circuit control.

Two Chloride batteries have been installed in the new Battersea power station of the London Power Co., Ltd. One, used for station power duties and as a standby for d.c. driven

The Metro-Vick stand at the recent Manchester Coal Exhibition

auxiliaries and important station lighting, consists of 117 GLW14 cells of 1,400 Ah capacity at the ten-hour rate of discharge. The other (117 GLW6 cells of 600 Ah capacity at the ten-hour rate) is used mainly for switch operation and indicating lamps in connection with the switchgear, and can be used also for control-room emergency lighting.

The orders received by the British Thomson-Houston Co., Ltd., during the year for trolley-bus electrical equipments, include the following: The Associated Equipment Co., motor and control equipment for Sydney; the Brush Electrical Engineering Co., Ltd., control equipments for Bournemouth and Derby; Karrier Motors, Ltd., motor and control equipments for Huddersfield; Ransomes, Sims & Jefferies, Ltd., control equipment for Huddersfield; the Sunbeam Motor Co., Ltd., motor and control equipments for Bournemouth, Birmingham, Huddersfield and Wolverhampton.

For the new College of Technology at Northampton, the General Electric Co., Ltd., has supplied 25,000 ft. of "Silverlac" conduit, the synchronous clocks, gongs, telephones, electrical bells and bell transformers. The electrical installation was carried out by the Bective Electrical Co., Ltd.

In connection with the extensive illumination scheme carried out by the Lowestoft Corporation a large quantity of strip lighting was supplied by the "Beeantee" Illuminations Ltd., including 7,800 holders and 9,000 lamps.

A Neat Yarrow Reminder

We have received from Yarrow & Co., Ltd., what appears to be an ash tray modelled after the company's boilers. The sides have imprinted on them views of the company's works and the flotilla leader *Dubrovnik*.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, July 19th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d.	—
METALS, ETC		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to1/9	—
b ,, Sheet and Foil ... ,,	1/2 to 2/9	
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£194	£7 dec.
Grade II ... ... ,,	£133	£5 dec.
Grade III ... ... ,,	£66	£2 dec.
c Brass (rolled metal 2" to 12" basis) per lb.	7¼d.	¼d. inc.
c ,, Tubes (solid drawn) ... ... ,,	9¼d. to 9¾d.	—
c ,, Wire, basis ... ... ,,	8d.	¼d. inc.
c Copper Tubes (solid drawn) ... ,,	10¼d.	—
g ,, Bars (best selected)... ... per ton		
g ,, Sheet... ... ... ,,	£68	—
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£42 10s.	£1 inc.
d ,, ,, Sheets ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£48	—
d ,, ,, H.C. Wire ... per lb.	7¾d.	¼d. inc.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
m German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. dec.
i Iron, Pig, (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English Pig ... ... ,,	£14 15s.	5s. dec.
g Mercury ... ... per bot.	£8 10s. to £9 5s.	5s. dec.
e Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/0½d.	½d. inc.
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8½d.	½d. dec.
r Steel, magnet, in bars ... ... ,,	7½d.	—
n Tin, Bloc (English) ... ... per ton	£216 to £218	—
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/5	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
o Johnson, Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

Social Events

The Bristol Electric Club selected the picturesque Stroud Valley and the Forest of Dean for its recent annual outing. Favoured with ideal weather the charabanc party, numbering about forty, including the president (Mr. A. J. Newman), proceeded to Cranham Woods and Birdlip and to Speech House in the Forest of Dean, where they were entertained at luncheon by Mr. R. Morris (sales manager) and Mr. F. Gale (works manager) of Ediswan Cables, Ltd., whose works were visited. At tea Mr. Newman and Mr. W. J. H. Walter (chairman) associated themselves with a vote of thanks to the Ediswan directors for their courtesy and hospitality. The homeward journey was made through Symonds Yat, Monmouth, Ross, and Gloucester.

On July 8th the Shoreditch Electricity Department's Sports Club, under the presidency of Mr. W. Weekes, borough electrical engineer, held its seventh annual sports meeting at Rye House, Hoddesdon. Many friends and guests were present, including the Mayor of Shoreditch and Coun. W. D. Ellis, chairman of the Electricity Committee. The weather was excellent and all the events were keenly contested. The programme included novelty races as well as the more serious events, and a race for the visitors was also included. At the close of the sports there was a "high tea," after which the Mayor presented the prizes. The evening ended with community singing and an entertainment by Miss Fairlie, Mrs. Crouch and Mr. W. Venables.

The annual outing of the staff of the Metropolitan Electric Supply Co. and associated companies took place on July 8th when a party of 500 visited Southsea. The journey was made by rail, and over nine hours of sunshine were enjoyed by the sea. At dinner the chair was occupied by Major H. Richardson, M.C., general manager, who responded to the toast of "The Company," which was proposed by Mr. A. E. Brooks.

On July 15th the Overhead Lines Department of the North Metropolitan Electric Power Supply Co. journeyed to Southsea for its annual outing. Lunch was served at the George Hotel, the chair being taken by Mr. R. T. Bayford, the overhead lines engineer. The party took the opportunity of a trip to the Isle of Wight, visiting the dockyards, and a flight over Portsmouth.

The St. Pancras Borough Council Electricity Department Sports and Social Club held its annual sports on July 15th at Eastcote. A large gathering of members, families and friends were conveyed to the ground by a fleet of private buses and an excellent day's sport was enjoyed. Mrs. Merry presented the prizes, and Mr. Robert Lee, the chief engineer and manager, thanked the organisers for a pleasant outing.

An Electric Cooking Demonstration Coach

The accompanying illustration shows the electric cookery demonstration coach of the Jackson Electric Stove Co., Ltd., in the village of Bare Green, where demonstrations were carried out for one week for Overhead, Ltd., operating in con-

The Jackson cookery demonstration coach

junction with the London and Home Counties Joint Electricity Authority. The value of these cooking demonstrations is considerable, and as the result of the visit to this particular village twenty cookers were ordered, which was considered very satisfactory.

New Catalogues and Lists

Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.—The July issue of the "Wigan Review."

Members of the Bristol Electric Club at the Ediswan Cable works, Lydbrook

The Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.—Publications No. C.L.901, relating to the "Juno" floodlight projector, and No. C.L.841, illustrating and describing "Ediswan" church lighting equipment.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Leaflet No. 882/2-3, dealing with horizontal-draw-out metal-clad switchgear and No. 900/1-33, pointing out the principal merits of the company's all-insulated house-service fusebox. Pamphlet No. 624, describing heavy-duty weatherproof plugs and sockets.

British Insulated Cables, Ltd., Prescot, Lancs.—Leaflet P.F.109, giving details of the company's electrolytic condensers (wet type).

B.E.N. Patents, Ltd., Gorst Road, Chase Estate, N.W.10.—Lists No. C.B.13 and 21, containing particulars and prices of paint-spraying equipment and drawing attention to the reduced price of the "Pneu-Spray."

The Magnetic Valve Co., Ltd., 43, Bloomsbury Square, W.C.1.—Pamphlet No. M.V.1, containing particulars of the "Modulator" control for combined hot water and heating systems.

Milne & Longbottom, Elm Works, Mere Lane, Rochdale.—A descriptive pamphlet of the "Elm" contactor starter.

General Electric Co., Ltd., Magnet House, Kingswav, W.C.2.—Leaflet 6612, giving detailed particulars of the "Home Broadcaster" microphone arrangement.

A booklet entitled "Magnet Hotplates" for the use of central station engineers, electrical contractors, and others interested in the sale and servicing of electric cookers.

McMichael Radio, Ltd., 265, Strand, W.C.2.—An illustrated leaflet relating to the "Duplex" suitcase portable radio receiver with a moving-coil loud speaker.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—Leaflets dealing with "Osram Striplite" lamps and "Claudegen" artificial daylight.

Hart Accumulator Co., Ltd., Stratford, E.15.—A price list (No. 244) of batteries for motor starting and lighting.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflet No. 190 relating to automatic motor starting pillars.

Babcock & Wilcox, Ltd., Babcock House, Farringdon Street, E.C.4.—Catalogue No. 1088/1, illustrating in colour a few of the many boiler installations carried out by the company in various parts of the world.

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—Pamphlet No. K81/6 describing with illustrations metal-clad oil-break switchgear.

Major Equipment Co., Ltd., 162, Millbank, S.W.—Leaflets dealing with new theatre lighting developments by the company.

Siemens & General Electric Railway Signal Co., Ltd., Central House, Kingsway, W.C.—A reprint of an article describing the re-signalling of King's Cross station (L.N.E.R.), for which the company's equipment was used.

The Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.—Literature drawing attention to a new four-valve moving-coil battery-operated receiver and an improved type of pick-up.

Private Arrangements

C. A. Lamb, electrical engineer, Clarendon Place, Hyde.—A meeting of creditors was held recently, when a statement of affairs was submitted which disclosed liabilities of £882 and net assets of £320, leaving a deficiency of £562. The debtor commenced business in partnership about thirteen years ago and in 1923 the partnership was dissolved. Since then the debtor had carried on business on his own account. An offer of 7s. 6d. in the £, payable as to 4s. cash and 3s. 6d. in three months, was accepted. It was further decided that a deed of assignment should be executed in favour of Mr. Arthur Scott, Hyde.

T. L. Rawson, radio and electrical dealer, 6, City Road, Chester.—A meeting of the creditors of the above was held recently when a statement of affairs was submitted which showed liabilities of £1,326 and net assets of £668, leaving a deficiency of £658. It was stated that one creditor had commenced proceedings and was in a position to levy execution, and it was therefore decided that the debtor should execute a deed of assignment in favour of Mr. John Whalley, Chester, as trustee. The creditors decided to confirm the deed provided that the loan creditors withdrew their claims against the estate. A committee of inspection was appointed.

J. W. Cusworth, electrical and wireless engineer, 12a, Bank Street, Mexborough.—A meeting of creditors was held recently in Sheffield. A statement of affairs was submitted which disclosed liabilities of £952 and total assets of £976, an estimated surplus of assets over liabilities of £24. As the debtor was desirous of carrying on the business it was resolved to investigate the matter further, and a committee of inspection was appointed. It was decided that in the event of the business not being continued the debtor should be requested to execute a deed of assignment in favour of Mr. Charles Turner, of Messrs. Poppleton & Appleby, Sheffield, as trustee.

Company Liquidations

Essex Radio Supplies, Ltd., 248-250, Bishopsgate, E.C., and elsewhere.—The statutory first meetings of the creditors and shareholders under the compulsory liquidation of this company were held on July 13th at Carey Street, W.C. A statement of affairs was presented showing total liabilities of £43,469 against assets of £13,419 and a deficiency of £30,549 with regard to contributories, the issued capital amounting to £500. The Official Receiver reported that the failure was attributed to non-delivery of orders under contract, loss sustained on obsolete stocks, and loss sustained on large purchases of American sets. In the opinion of the Official Receiver the failure was directly attributable to mismanagement on the part of the directors. Mr. Arthur Sweet, F.C.A., 66, Victoria Street, S.W., had been employed by the Official Receiver to make an investigation into the affairs of the company. This report had only recently been received and it was not proposed at present to state what action would be taken. The liquidation was left in the hands of the Official Receiver.

J. Lewtas, Ltd., lamp manufacturers, Manchester.—The statutory meeting of the creditors was held on July 11th, at the offices of Messrs. A. P. Smith & Co., 3, York Street, Manchester. The statement of affairs showed liabilities of £2,408, and net assets of £152, leaving a deficiency of £2,256. The issued capital of the company was £1,304, making a total deficiency of £3,560. It was reported that the company was incorporated in 1929. In April, 1931, a debenture for £1,000 was created, and the holder was now appointed as receiver. It was stated that the company had been in financial difficulties for some time. The present position appeared to be due to heavy overhead expenses, coupled with a small turnover. A short time ago a scheme was formulated for the payment of a composition of 10s. in the £, but owing to the appointment of the receiver it had been abandoned. A meeting of the shareholders had already been held, when it was decided to nominate Mr. F. J. Connor, Manchester, as liquidator, and the creditors confirmed that appointment. A committee of inspection was also elected.

Wates Radio, Ltd., wireless manufacturers, 134/8, Shaftesbury Avenue, W.C.2.—A meeting of creditors was held on July 10th in London. A statement of affairs as at June 30th, 1933, was submitted, which showed total assets of £4,956 and a deficiency of £685. The solicitor to the company stated that a previous meeting of creditors had been held when it was recommended that the company should go into voluntary liquidation. Mr. Wates stated that the company was formed in September, 1932, with a nominal capital of £5,000, but owing to the unexpected slump it could not trade at a profit although every economy was effected. Resolutions were passed appointing Mr. C. Latham, of 78, New Oxford Street, W.C., as liquidator, with a committee of inspection.

D. O. Williams & Co., Ltd.—Meeting August 16th at Midland Bank Buildings, Castle Square, Swansea, to receive an account of the winding up by the liquidator, Mr. J. Smith.

Park Radio & Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. W. Sears, 4, Parkshot, Richmond, Surrey.

Robert Walker (Factors), Ltd.—Winding up voluntarily. Liquidator, Mr. T. Bell, 53, Grey Street, Newcastle-upon-Tyne.

Pantheon Radio, Ltd.—Winding up voluntarily. Liquidator, Mr. W. H. Rowlands, 52, Castle Street, Liverpool.

William Johnson & Co. (Sheffield), Ltd.—Particulars of claims by July 31st to the liquidators, Messrs. C. Turner and H. E. Jenkinson, 155, Norfolk Street, Sheffield.

Radio-Tricity, Ltd.—Meeting, August 14th, at 150, North Street, Brighton, to receive an account of the winding-up by the liquidator, Mr. P. F. James.

Anglo Radio Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. L. Chubb, High Holborn House, W.C.

Bankruptcy Proceedings

L. Wardleworth (L. & V. Wardleworth), radio and electrical engineer and contractor, 335, Bury Old Road, Prestwich.—Public examination September 20th at the Court House, Encombe Place, Salford.

A. E. Tucker, electrical contractor, 9, Courtney Road, Waddon, Surrey.—First meeting July 27th at 29, Russell Square, W.C. Public examination, September 21st, at the County Court, Scarbrook Road, Croydon.

G. W. Mitchell, electrical engineer, 34, Locks Hill, Portslade, Sussex.—This debtor's application for discharge was heard at the Court House, Brighton, on July 13th. The receiving order was made last year. The discharge was granted, subject to twelve months' suspension.

Dissolutions of Partnership

R. E. Warren, electricians, Albert Road, Torquay.—Messrs. R. E. Warren and W. S. Fray have dissolved partnership.

Sheffield Radio & Electric Co., electrical and wireless factors, 39, Eyre Street, Sheffield.—Messrs. J. E. Inman and W. Marshall have dissolved partnership. Mr. Marshall will carry on the business and all debts will be attended to by Messrs. Ransom, Harrison & Lewis, 11, York Street, Sheffield.

Knight & Co., electricians, 261, Anlaby Road, Hull.—Messrs. L. Bennett & W. R. Knight have dissolved partnership. Mr. Knight will attend to debts and carry on the business.

Parade Electrical Stores, electrical engineers, 507, Lordship Lane, East Dulwich, S.E.—Messrs. D. Chalker and C. Peckham have dissolved partnership. Mr. Chalker will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—STREET LIGHTING.—The renewal of the overhead lighting in Albyn Place is recommended by the Watching Committee (£254).

Australia.—THE BALLARAT UNDERTAKINGS.—The electrical and transport undertakings at Ballarat will shortly be taken over by the State Electricity Commission. Feeling has been revived in favour of continuing local distribution of power. As the load factor for Ballarat is 26 per cent., it is contended that it would continue to be cheaper than inclusion in the contemplated ring main.

Bardney.—STREET LIGHTING.—A parish meeting has authorised the expenditure of £200 on the installation of electric street lighting.

Bedford.—PRICE REDUCTION.—The Electricity Committee recommends reducing the charge in the rural demonstration area fom 7½d. to 7¼d. per kWh.

LOANS SANCTIONED.—The Electricity Committee has obtained

An effective study of the waterfall at Ramsgate which is illuminated with vari-coloured lights and is proving a great attraction to visitors

sanction to borrow £15,000 for house wiring, £20,000 for apparatus, £700 for switchboards, and £1,745 for a duplicate supply to Marston Valley brickworks.

STREET LIGHTING IMPROVEMENTS.—The Electricity Committee reports that it has had in contemplation for some time a general improvement of the street lighting throughout the borough, and it has selected a new standard fitting equipped with refractors and proposes to replace the existing fittings with others of this type throughout the greater part of the borough. It is also proposed to increase the height of the standards by means of extension brackets. The estimated cost of effecting this improvement is £2,500, and it is recommended that the work should be spread over a period of five years. The Electricity Committee is to apply for sanction to borrow £50,000 for mains and services in respect of requirements for the next three years.

Bedworth.—FRINGE ORDER.—The Lighting Committee of the Urban District Council has reported that it has received a letter from the City of Coventry Electricity Department stating that the City Council has agreed that the Leicestershire and Warwickshire Power Company obtain a Fringe Order to supply Bedworth Hill with electric light.

Belgium.—THE BRUSSELS POWER STATION.—Most of the plant damaged in the fire at the central power station in Brussels last autumn has now been repaired and is in operation in a temporary machine-room. The output of the plant is nearly normal, and the Brussels Municipal Council is now taking supplies only during the night from the distribution system of the Société Interbrabant. Work has been started on the erection of a new station to replace the one destroyed by fire, and this is to be completed within seven months.

PROGRESS OF ELECTRICITY SUPPLY.—At the beginning of this year 2,574 communes, with 8,100,000 inhabitants, were provided with electricity, only ninety districts (population 60,000) not receiving supplies; the latter are mainly situated in West Flanders, Luxembourg and Limburg. Private companies were responsible for the supply to 1,983 communes, 591 communes being served by public undertakings. The number of consumers is now 1,130,000, but the energy consumed declined by 6½ per cent. during 1932. Some interest-

ing details are given in a recent issue of the Bulletin of the Union des Exploitations Electriques en Belgique of the progress made during the past two years by the electricity undertakings in Belgium affiliated to the Union. These show that the installed capacity of the various central stations now aggregates 1,360,000 kVA, as compared with 1,285,000 kVA in 1931. The output of these stations decreased, however, from 1,714 to 1,585 million kWh. Including the power purchased from non-affiliated plants, the total output fell from 1,804 to 1,685 million kWh. The power was supplied to 1,925 communes, fifteen more than in the preceding year, the number of consumers increasing from 1,102,830 to 1,127,900. The affiliated concerns now operate 3,550 miles of overhead h.p. and 4,782 miles of underground h.p. cables, and 14,187 miles of overhead l.p. and 1,562 miles of underground l.p. mains.

Blackburn.—SUPPLY TO COPSTER GREEN.—The Electricity Committee has agreed to supply electricity to Copster Green, by means of overhead cable, at a cost of £1,140.

Blackpool.—NEW SWITCHGEAR.—The Electricity Committee is to replace switchgear, &c., in old transformer houses at a cost of £5,500, while £2,500 is to be spent on the erection of five transformer sub-stations and equipment.

Bradford.—WORK IN HAND.—The Electricity Committee is to provide a sub-station in Filey Street at a cost of £3,162 and replace switchgear at Rawson Rd. sub-station at a cost of £1,372. The system of supply in the Hall Lane area is also to be changed at a cost of £14,019.

Bridlington.—LOAN.—The Town Council is to apply for sanction to a loan of £2,939 for work in connection with supplying electricity to Sewerby-cum-Marton, and to the Buckrose Light & Power Co., Ltd., to enable the latter to provide a supply for Flamborough.

Bromley (Kent).—PRICE REDUCTIONS.—The Town Council has made the following reductions in charges: Flat rate for lighting, from 4¾d. to 4¼d. per kWh. All-in tariff: Rateable value charge from 7½ to 7 per cent., with a minimum of 6s. per quarter. All-in tariff for business premises: From £12 per kW of lighting installed to £11. Flat rate for cinemas and theatres: From 3d. to 2¼d. per kWh.

Burton-on-Trent.—LOANS FOR EXTENSIONS.—The Town Council has applied for loans of £30,000 for mains and services and £2,500 for transformers. The mains are to be extended to Far Fillymore Hill Hanbury.

Chichester.—TARIFF REDUCTIONS.—The Electricity Committee recommends a reduction of ¼d. per kWh for electricity for lighting in the city and of ⅛d. per kWh outside, and also a reduction of ¼d. per kWh inside the city on the two-part tariff and $\frac{5}{16}$d. outside, with a discount of 5 per cent. for prompt payment of accounts. It is also recommended that the Council should lay 100 ft. of service cable free instead of only 60 ft. as at present.

Clacton-on-Sea.—LOANS.—The Urban District Council has applied for sanction to the following loans:—Mains and services, £6,000; relaying of mains, £1,000; meters, £4,000; domestic appliances, £1,000; and construction of additional storage accommodation at the electricity works, £500.

Colchester.—LOANS.—The Electricity Committee is seeking permission to borrow £10,000 for mains and services, £2,000 for sub-station plant, £10,000 for meters, £4,000 for wiring installations, and £7,500 for apparatus.

Coombe Martin (Devon).—OVERHEAD LINES SANCTIONED.—The Parish Council has received an intimation that an overhead system has been sanctioned for the supply of electricity to the village, with the exception of the last section on the harbour east of Newberry Beach.

Coventry.—LOAN APPLICATION.—The City Council is to apply for sanction to a loan of £4,111 for plant and mains extensions.

Desborough.—ELECTRICITY CHARGES.—The Urban District Council has protested that 6d. per kWh, plus 15 per cent., the charge made for electricity by Kettering Electricity Department, is too heavy. If no satisfaction is obtained from the Kettering authorities complaint is to be made to the Electricity Commissioners.

Dorchester.—EXTENSIONS.—The Town Council is to carry out various mains extensions in the borough, and a loan of £1,550 has been applied for.

Dover.—YEAR'S WORKING.—The electricity undertaking last year showed a net profit of £6,318.

Dumfries.—STREET LIGHTING.—The County Council's scheme for the electrification of the whole of its area is progressing rapidly, and supplies will be available practically throughout the county by the end of the present year. It is expected that electricity will then be available in six boroughs and over seventy villages. The Council recently resolved to convert the present gas lighting in certain districts and to extend or form other special lighting districts using electric lighting throughout. The districts concerned include Thornhill, Kirkconnel, Moniaive, Glencaple, Penpont, Gretna, Eastriggs and Ecclefechan. The Town Councils of the boroughs of Moffat, Langholm and Lochmaben have also adopted schemes prepared by the county electrical engineer (Mr. J. S. Pickles), and arrangements are being made for the whole of these improvements to be available for the lighting season in September next.

Elmstead.—SUPPLY EXTENSION.—The Parish Council has requested the Colchester City Council to extend the supply of electricity on the main Clacton road before next winter.

Flamborough.—SUPPLY SHORTLY.—The Buckrose Light and Power Co. has informed the Parish Council that contracts have been placed in connection with an electricity supply for the village.

Formby.—NEW BUSINESS TARIFF.—The Urban District Council has adopted for business premises a two-part tariff with a fixed quarterly charge of 7½ per cent. on the rateable value, plus 1d. per kWh.

APPLICATION FOR SUPPLY.—An application has been received for a supply of electricity to 350 houses proposed to be erected outside the area of supply, and the electrical engineer is to report upon the matter.

Gainsborough.—LOAN.—The Urban District Council has applied for sanction to loans of £2,500 for consumers' wiring installations and £1,300 for meters.

Garelochhead.—SUPPLY IN NEAR FUTURE.—The Clyde Valley Electrical Power Co. proposes to make an extension to Garelochhead and, provided the necessary support is forthcoming, electricity will be available by December 24th.

Gillingham.—LOAN SANCTIONED.—The Corporation has received sanction to borrow £3,874 for sub-stations and equipment.

Great Yarmouth.—SUPPLY TO WRENTHAM.—The Electricity Committee is to proceed with the provision of supply to the Wrentham area at a cost of £4,328.

MAINS EXTENSION.—The Electricity Committee has decided in connection with feeder extensions to Hopton to lay a further length underground at an extra cost of £1,072 in view of the possibility of the provision of an aerodrome in the vicinity.

Grimsby.—PROGRESS OF THE UNDERTAKING.—Mr. S. R. Windle, the borough electrical engineer, in his annual report, states that particularly good progress has been made during the last seven years. The capacity of the generating plant has been increased from 7,720 to 25,500 kW, and the total length of cable, which was 179 miles, is now double. The number of consumers has risen from 6,799 to 15,167, and the amount sold from 14,620,593 to 28,754,638 kWh. The coal consumption per kWh sold has been reduced from 3.11 lb. to 2.16 lb., lowering the cost per kWh from 0.835d. to 0.614d.

Hastings.—LOWER CHARGES TO CINEMAS.—The borough electrical engineer has recommended that the supply to cinemas should be reduced to 1½d. per kWh up to a minimum of £360 per annum and to 1d. per kWh beyond.

SUPPLY TO NEWENDEN.—A temporary supply is to be given at Newenden to the Weald Electricity Supply Co., the latter to erect overhead lines from the Corporation's terminus at Northim, and to pay £3 15s. per kW per annum, and £2 10s. per quarter to cover line and transformer losses.

LOAN APPLICATIONS.—Loans totalling £26,000 for electricity purposes are to be applied for.

ELECTRICITY IN FISHING.—It is also recommended that electrical haulage be installed for the fishing fleet, with the provision of six capstans, at a cost of £2,265.

Hemel Hempstead.—SUPPLY TO FLAMSTEAD.—The Rural District Council has consented to the erection of an overhead line by Luton Corporation for a supply of electricity to Flamstead.

Ilford.—LOANS SANCTIONED.—The Electricity Committee has obtained sanction to borrow £1,500 for switchgear, £10,000 for wiring installations, and £2,430 for sub-stations.

Ilfracombe.—A NEW TARIFF.—In return for the Town Council undertaking not to exercise its purchase option within seven years, the Ilfracombe Electric Light & Power Co., Ltd., is to inaugurate a two-part tariff for domestic and business premises on terms uniform throughout the Edmundson group of companies, flat rates for lighting and power and a reduction of 1s. per meter per quarter in meter rents. In connection with the domestic two-part tariff, an assisted wiring scheme is to be offered.

Inverness.—CHEAPER ELECTRICITY.—The rate for lighting is to be reduced from 6d. to 5½d. per kWh and that for power and heating from 1¾d. to 1½d. per kWh as from August 15th next.

Japan.—NEW POWER STATION.—Our Yokahama correspondent reports that a steam power station of 100,000 kW is to be erected by the Tokyo Electric Light Company at a cost of 10,000,000 yen.

Jugo-Slavia.—HARNESSING THE DANUBE.—Plans have been drawn up for the regulation of the Danube at its narrowest and fastest point Orsova, reports *Reuter* from Belgrade. At this point the Danube forms the boundary between Roumania and Jugo-Slavia, and engineers of the two nations have collaborated to work out the present scheme. The scheme will increase the tonnage of shipping which can pass up the river, and the erection of two generating stations is also provided for to produce at the Iron Gates 404,000 h.p. and at the Greben rapids 380,000 h.p. This current could be used to electrify the railways of large areas of Roumania and Jugo-Slavia and to encourage the rise of industry in the Roumanian and Jugoglav Banat. It is estimated that if the turbines ran only for 5,000 hours a year the cost of production of current would be 0.14d. per kWh.

Keighley.—YEAR'S WORKING.—The Corporation electricity undertaking made a net profit last year of £4,338, as com-

pared with £3,421 in the previous year. A total of 17,018,484 kWh of electricity was sold, an increase of over a million kWh.

Kidderminster.—OVERHEAD LINE OBJECTIONS.—The Rural District Council is to object to the use of overhead lines by the Shropshire, Worcestershire and Staffordshire Electric Power Co. at Bewdley and Cookley.

Lichfield.—SUPPLY EXTENSIONS.—The City Council has applied to the Electricity Commissioners for approval of a scheme to give a supply of electricity to Streethay and Trent Valley Maltings, and an order has been secured for the supply to Yoxall.

London.—BATTERSEA.—The Electricity Committee has obtained sanction to borrow £13,530 for plant and buildings.

FULHAM.—The Electricity Committee has obtained sanction to borrow £10,000 for sulphur elimination plant, £15,000 for house services, £10,000 for meters, and £5,000 for apparatus.

SOUTHWARK.—The Electricity Committee recommends mains extensions at a cost of £3,543 in connection with a proposal to supply a large concern in the borough.

CESSATION OF LOCAL GENERATION.—The Electricity Committee recommends ceasing to generate electricity as from April 1st, 1935, and take all requirements from the City of London Electric Lighting Co., Ltd., and to seek sanction to borrow £27,665 for the provision of the requisite converting plant.

ALL-IN RATE.—The Electricity Committee recommends a continuance of the experimental all-in rate of a fixed charge based on floor area, payable in advance, plus ½d. per kWh metered.

STOKE NEWINGTON.—A recommendation by the Electricity Committee that £3,529 be spent on cookers, meters, wiring, &c., has been approved by the Finance Committee. The committee also recommended that where the consumer provides and maintains the necessary wiring and apparatus, electricity be supplied for commercial cooking at ¾d. per kWh.

Lowestoft.—UNDERGROUND CABLES TO REPLACE OVERHEAD LINES.—The Electricity Committee has decided to replace the overhead system at Hall Road, from Prospect Road to Chestnut Avenue, by underground cables, including main services and public lighting, at an estimated cost of £1,175.

TRANSMISSION LINE EXTENSION.—The Electricity Committee is applying for sanction to borrow £1,100 for the purpose of extending the h.p. transmission system at the south side of the harbour.

Mansfield.—YEAR'S WORKING.—The accounts for the year ended March 31st, which we have received from the borough electrical engineer, Mr. E. Holcombe Hewlett, show a total revenue of £58,175 with a working expenditure of £36,360. In the net revenue account £3,593 was put to the reserve fund. The amount sold was 6,163,344 kWh, with a maximum demand of 3,050 kW.

Morocco.—GROWTH OF SUPPLY.—The industrialisation of Morocco during recent years has been accompanied by a rapid increase in the demand for electrical energy. In 1927, electricity supply was available only at Casablanca and the consumption was about 1 million kWh. In 1932, however, Casablanca used over 40 million kWh in its cement works, breweries, slaughter houses, harbour and transport undertakings; and, according to *Elektrotechnische Zeitschrift*, the total consumption of the country amounted to about 100 million kWh. The principal power stations are the hydro-electric plants of Si Said Machou and Oued Fez and the thermal station at Casablanca.

North Wales.—DEVELOPMENT IN THE WREXHAM AREA.—Electricity Distribution Co., of North Wales, has decided to carry out development work in the Brymbo, Broughton, Moss, Brynteg, Summerhill, and Gwersyllt sections of the Wrexham rural area. The exact position of the lines will be influenced by the results of the canvass of the areas and the amount of business the company is able to secure.

Oxford.—LOWER CHARGES.—The City Council has adopted the following revised scale of charges: domestic two-part tariff, a fixed quota of electricity per quarter at 4¾d. per kWh and ¾d. per kWh beyond; business premises, including licensed premises, for lighting, heating, cooking, and all approved business electrical appliances, a standing charge of £13 10s. per kW per annum of lighting installed, plus a "unit" charge of 1d. Flat rates: lighting, first 3,750 kWh per quarter, 6d.; next 2,000, 5d.; beyond, 3½d. Prepayment meters, 7d. Places of worship, 4d. Shop-window lighting, advertising, outside lighting, signs, petrol pumps, and motor car showrooms, 2½d. per kWh, subject to a guarantee of 10s. 6d. per annum per 100 W. Heating, 1½d. Small motive power—winter quarters, first 250 kWh per quarter, 2½d.; next 3,000, 1¾d.; beyond, 1½d.; summer quarters, first 3,250 kWh per quarter, 1¾d.; beyond, 1½d. Water heating, flat rate of ½d., if controlled by thermostat supplied with heater. Meter rentals, up to 10 A, 1s. 6d. per quarter; 10 to 30 A, 3s.; 30 to 50 A, 3s. 10d.; and 50 to 100 A, 4s. 6d.

Paisley.—GRID SUPPLY FOR MESSRS. COATS, LTD.—For some time past negotiations have been proceeding between Messrs. J. & P. Coats, Ltd., the Paisley Corporation, and the Central Electricity Board regarding the supply of electricity to the mills. It is proposed that the mills will in future take their electricity supply from the grid instead of producing it themselves. At its last meeting the Town Council approved generally of a memorandum on the subject prepared by the Central Board.

Portsmouth.—LOAN SANCTIONED.—The Electricity Committee has obtained sanction to borrow £4,350 for boiler plant at the power station.

The annual accounts of the Electricity Committee for the year ended March 31st last show the largest surplus ever recorded in the history of the undertaking. After payment of sinking fund and other charges, the surplus on the net revenue account is £66,371, out of which it is proposed to appropriate £13,784 for new meters and £5,096 for the installation of new apparatus, while sanction is being sought to devote £5,173 to capital expenditure. Mr. B. Handley, the engineer and manager, in his report, states that the increase in the sales of electricity was 6,408,161 kWh on last year: the amount sold totalling 50,931,130 kWh. The average cost per kWh sold was 1.08d., compared with 1.26d. in 1931-32, and the cost per kWh for fuel (0.18d.) fell by 10 per cent., although the price of coal fell by less than 2 per cent. The apparatus on hire at the end of the financial year comprised 10,229 domestic appliances and 775 motors. The number of consumers connected under the assisted wiring scheme during the year was 1,989, making a total of 2,586. New mains laid totalled 59 miles, new distributing areas being inaugurated at Swanwick, Warsash, Hambledon, Catherington, and Stockheath. The net surplus of £42,300 was achieved in spite of the fact that the charges for lighting and domestic supplies were reduced by more than 7 per cent.

Rotherham.—TARIFF REDUCTIONS.—The Town Council has adopted a new tariff with the following charges: lighting, first 250 kWh per quarter, 4½d. per kWh; next 750, 4d.; next 1,000, 3½d.; next 1,000, 3d.; next 2,000, 2½d.; next 2,000, 2d.; next 2,000, 1½d.; and beyond, 1d. Outside lighting, 1d. per kWh (against 2½d.); late shop window lighting, 1d. (against 2½d.); heating for all purposes, ½d. per kWh (against 1½d. and 1d.).

Sale.—SPECIAL ORDER.—The Urban District Council has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of electricity supply so as to include the parish of Ashton-upon-Mersey.

Scotland.—SUPPLY TO NAIRNSHIRE.—Plans are now complete for the extension of the electricity supply to Nairnshire and the eastern counties. The next stage, which is to be proceeded with shortly in connection with the Highland Electricity Supply Co.'s scheme, is to introduce the power to Nairn and Forres by 3,000-V overhead lines. Nairn County Council has approved of the scheme.

South Africa.—JOHANNESBURG ESTIMATES.—In presenting the Johannesburg municipal estimates for the year 1933-34, Mr. W. Fearnhead, chairman of the Finance Committee, said that the increased surplus of £55,058 from the Electrical Department was chiefly accounted for by a decrease in capital charge of £17,787 and £20,000 provided but not spent on the President Street plant. The increase in revenue was £3,712. They were allowing for a reduction in income of £44,560 in respect of the amended electricity tariff which operated from July.

Spalding.—REVISED CHARGES.—The Urban District Council has adopted a revised scale of charges.

PURCHASE OF UNDERTAKING.—At a meeting of the Council on July 5th the clerk reported the receipt of a revised offer for the purchase of the undertaking, and the matter is to be considered by the Council in committee.

Swansea.—HIRE AND HIRE-PURCHASE SCHEMES.—The Electricity Committee has approved of the Works Sub-Committee's recommendation that hire and hire-purchase facilities be afforded consumers. The borough treasurer and borough electrical engineer are to prepare and submit a scheme.

NEW E.H.P. MAIN.—The Electricity Committee is to lay an e.h.p. main from Morriston to a sub-station to be constructed at Cwmrhydyceirw quarry, at an estimated cost of £2,100.

Swinton and Pendlebury.—EXTENSIONS.—The Urban District Council has decided to carry out main extensions in the Liverpool-East Lancashire Road at an estimated cost of £1,717.

ELECTRICITY FOR CLOCKS.—Electricity is to be supplied to electric clocks at 1½d. per kWh.

Taunton.—LOANS.—The Electricity Committee has recommended the Town Council to rescind a resolution passed in April (in so far as it authorised application to be made for sanction to the borrowing of £20,000) and to make application for sanction to the borrowing of £58,000 to cover the specific works in the scheme of development of the urban and rural area of supply. The committee further recommends the Council to apply for sanction to the borrowing of £1,000 for the acquisition of small sites for transformer sub-stations. The Council has approved these recommendations.

LOW CHARGES.—The report on the past year's working of the undertaking shows that from a return issued by the Electricity Commissioners the fuel consumption per kWh during 1932 was again the lowest in Great Britain as compared with other similar supply stations. Taunton has held this position for the last ten years.

Uttoxeter.—LOAN SANCTIONED.—The Urban District Council has received sanction to a loan of £13,309 for electricity purposes.

Whitehaven.—The Town Council has reduced the charge for electricity for cooking and heating for the quarter ending Sept. 30 next from 1½d. to 1d. per kWh.

Traction

Argentina.—DIESEL-ELECTRIC TRACTION.—The first of the new diesel-electric traction units, comprising a locomotive and eight trailer coaches, on the B.A.G.S. Railway has been placed in service on the line from Plaza Constitución Terminus (Buenos Aires) to Ezeiza.

France.—NEW ELECTRIC LOCOMOTIVES.—Twenty-five 4,000-h.p. high-speed locomotives are now in course of delivery to the Paris-Orléans Railway, for express service on the Vierzon-Brive and Orléans-Tours divisions, the electrification of which, at 1,500 V d.c., has only recently been completed. The new locomotives weigh 135 tons, have a maximum speed of 87 m.p.h. (140 km.p.h.), and are fitted with regenerative braking capable of decelerating a 750-ton train from 75 to 16 m.p.h. on a 1 in 100 grade.

Germany.—NEW UNDERGROUND RAILWAY FOR BERLIN.—Owing to the waste of time involved in travelling by bus or taxi between the main line termini in Berlin, the Government has decided to build an underground railway connecting them. It is estimated that the cost will be about 560,000,000 Rm.

Irish Free State.—SECOND DRUMM TRAIN.—The second Drumm train will be ready for service very soon. Work in connection with its completion is making good progress at the railway works in Inchicore, Dublin. The new train, when finished, is to consist of three coaches, and already it has undergone a series of satisfactory trials at Inchicore.

Italy.—PRIVATE RAILWAY ELECTRIFIED.—The electrification of the Emiliana Railway, which runs from Modena to Vignola, Mirandola, and Sassuolo, has just been completed. The line has a total length of 89 miles, and the conversion work has been spread over three years.

London.—CAMBERWELL.—A *Times* report says that schemes for the provision of automatic traffic control signals have been considered by the Works Committee, which recommends the Council to approve the installation of signals at points suggested by the Minister of Transport. The estimated cost of four installations is £2,113, and the annual maintenance charges £370. The Ministry of Transport will bear 60 per cent. of the cost.

Manchester.—COST OF CURRENT.—The price paid by the Transport Department for electricity for the operation of the trams during the past year was 0.811d. per kWh, as against 0.831d. in the preceding year. The average consumption per car mile was 2.295 kWh, as against 2.231 kWh the previous year. Traffic revenue per car mile was 17.053d., and working expenses per car mile 13.892d.

Russia.—SUBURBAN ELECTRIFICATION.—Electrical operation at 1,500 V d.c. has just been commenced on the 15-mile Moscow-Obiralovka line, in place of steam traction, and the journey time of the stopping trains has been reduced from 55 minutes to 32 minutes. The Leningrad-Ligovo suburban line has also been electrified, and conversion work is now proceeding on the Ligovo-Oranienbaum and Gatchina lines, the total estimated cost being 14,000,000 roubles.

SOVIET ELECTRIC LOCOMOTIVES.—The first Soviet electric locomotives built at the Dynamo Works have shown excellent results when tested recently. Two locomotives, one weighing 132 tons and the other 114 tons, were given a trial run, drawing a passenger train of 450 tons over the Suram Mountain pass from Stalinissi to Zestafoni. Two plants were engaged in building these electric locomotives, the Kolomna plant furnishing the mechanical equipment, and the Dynamo Works the motors and electrical equipment.—*Railway Gazette.*

South Africa.—NEW TRAMCARS.—The Johannesburg City Council has approved the recommendations of the Tramway Committee which include the expenditure of £140,000 on thirty-five new tramcars and £8,300 on doubling the present tramway track between Vrededorp and Brixton. Recommendations to withdraw the tramway services to the southern suburbs and to replace them by omnibuses were referred back to the Committee. Tenders for five of the new tramcars have already been received.

Spain.—RAILWAY ELECTRIFICATION.—It is reported from Madrid that the Spanish Northern Railways Company has decided to proceed without delay with the electrification of the lines between Madrid and Avila and Segovia, which form the first section of the main line between Madrid and Hendaye. The expenditure is estimated at 80,000 pesetas, towards which the State will make a contribution. *Reuters Trade Service* learns from Madrid that foreign industries will be allowed to supply only 15 to 20 per cent. of the material required.

Three Bridges.—SOUTHERN RAILWAY ACCIDENT.—The Ministry of Transport report on the collision at Three Bridges on January 28th, when a steam freight train, while crossing from one line to another, was run into from the rear by an electric passenger train at night, shows that the accident was due to the failure of the motorman, after being brought to a stand by an automatic colour-light signal, to observe the rule restricting his speed to 5 m.p.h. when he passed the signal at danger after waiting three minutes in accordance with the "stop and proceed" rule. It is stated in the report that this method of operation is safe only if the speed regulation is strictly observed.

Communications

France.—THE RADIO-TOULOUSE PROGRAMMES.—The concerts given by Radio-Toulouse will be resumed shortly from a new station, which has been installed at the Chateau de Saint Agnan to take the place of the station destroyed by fire several months ago.—*Reuter* (Paris).

Great Britain.—RADIO RELAY SERVICES.—One of the relay stations of Broadcast Relay Service, Ltd., at Hull, was damaged by fire this week. The service was restored from another source.

The Guildford Town Council has rejected an application by British Concessions, Ltd.

London Radio Development Services have applied to the Barking Town Council for permission to establish a service.

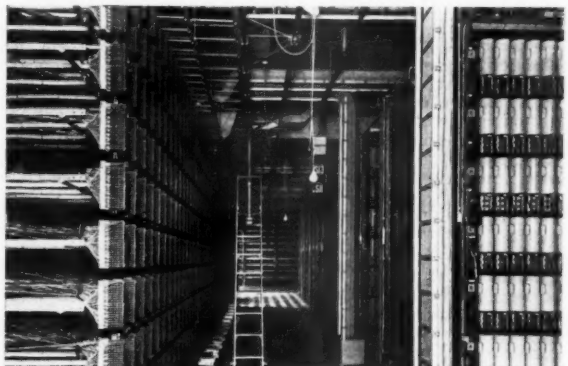
The Bristol Corporation Sanitary and Improvement Committee is considering offers made by Rediffusion, Ltd., and Universal Wireless Relay, Ltd.

The Worcester City Council has consented to the establishment of a relay service in the city by the Swindon Radio Relay Exchange, Ltd.

The Petersfield Urban Council has granted permission for the installation of a relay exchange by a Portsmouth firm on a ten years' agreement.

London.—TELEGRAPHY.—The General Post Office is shortly to introduce simpler telegraph forms, as the present forms are considered to be overloaded with printed matter. An improvement is reported in the use of the telegraph service since May, when it was 6.5 per cent. better than in May, 1932.

KENSINGTON TELEPHONE EXCHANGE.—The opening of one of the largest telephone exchanges in the London director area took place on July 15th, when the new Kensington local and sub-tandem exchange, situated in Chelsea, was brought into service. Over 5,000 subscribers' lines were connected, the majority of which were transferred from the original manual exchange and are thus now converted to automatic working. The manufacture and installation of the equipment, which has taken nearly two years to complete, was carried out for the Post Office by the General Electric Co., Ltd. The apparatus provided forms a local exchange of 10,000 lines capacity, equipped initially for serving 9,000 subscribers, and a tandem switching centre to serve the western area of London, the building being suitable for ultimate extension to accommodate 30,000 subscribers' lines and a considerable increase in the tandem equipment. For floodlighting the frames parabolic reflectors are used above the platform, and in order to avoid projecting lamp fittings and so ensure unobstructed gangways striplights are used below. The equipment includes duplicate motor generator sets and ringing machines; an eight position test desk, and a test jack frame and routiner for testing the junctions both from the desks and automatically; and duplicate twenty-five cell batteries each having a capacity of approximately 10,000 Ah, provision being made for extension to 15,000 Ah at a later date.



The new Kensington automatic exchange

Portugal.—NEW BROADCASTING STATION.—A new broadcasting station, working on the short wavelength of 31.25 metres, was inaugurated on July 14th. It is situated near the capital and will be known as the Lisbon (CTIAA) station.

Somerset.—B.B.C. TESTS.—Reception test transmissions of alternative programmes began from the West Regional station on Monday last, July 17th, working on a wavelength of 261.6 metres (the same wavelength as the London national programme transmitter), and in addition the West National transmitter radiated the national programme from July 19th, while the West Regional transmitter radiated an alternative regional programme. These test transmissions are intended to help listeners in the West Region to confirm that their receivers are suitable for alternative programme conditions. The effect of the synchronisation of the two transmitters will be to reduce slightly the service area of the London National transmitter during hours of darkness. Listeners who are affected should take their National programme from Daventry (5XX) on 1,554 metres.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—MELBOURNE.—Posts and Telegraphs Department. September 5th. Telephone instrument cords. (A.Y. 11878.)* Telephone switchboard cords. (A.Y. 11879.)*
September 12th. Telephone switchboard plugs. (A.Y. 11880.)*
August 29th. Radio measuring equipment. (A.Y. 11885.)*
September 12th. Condensers. (A.Y. 11895.)*
State Electricity Commission. August 21st. Power, telephone and pilot cables. (A.Y. 11877.)*
September 12th. Four radio broadcasting stations at Townsville, Grafton, Sale and Launceston. The first two are to have an initial power of 5 kW each, with an ultimate power of 20 kW, while the others will have initial and ultimate powers of 2 and 10 kW.—*Tenders.*
August 14th. City Council. Fibre or glazed stoneware conduits. City electrical engineer (deposit £1 1s.).

Bedford.—July 24th. Electricity Department. Transformers. (July 7th.)

Colchester.—July 24th. Royal Eastern Counties Institution, Ltd. Electrical installation at new home for mentally defectives. (June 30th.)

Dagenham.—July 31st. Urban District Council. Electrically driven vertical centrifugal pumping set. Specification (£2 2s.) from the engineer and surveyor, Council offices.

Eastbourne.—July 24th. Electricity Department. 200-kVA and 300-kVA transformers. (July 14th.)

Fife.—July 31st. County Council. Various works, including electric lighting, at sixty houses. Schedules from Messrs. C. R. Douglas & Son, surveyors, Dunfermline (deposit one guinea). Offers to J. M. Mitchell, county clerk, Cupar.

Glasgow.—July 28th. Corporation Education Department. Electrical work at temporary school, Wyndford, Maryhill. Specifications, &c., from Education Offices (deposit one guinea). Offers to Town Clerk.

India.—SIMLA.—August 1st. Indian Stores Department. Two 75-kW motor-generator sets; 5-kW booster; switchboard. (A.V. 11881.)*

London.—ISLINGTON.—August 9th. Electricity Department. H.p. switchgear and other accessories. (June 30th.)

Manchester.—August 9th. Rivers Committee. Electrical equipment, including l.p. switchboard, lighting and power installation and cable work, for the Davyhulme sewage works extension. (See this issue.)

New Zealand.—WELLINGTON.—September 12th. Posts and Telegraph Department. Battery plates. (A.Y. 11898.)*

Portuguese East Africa.—LOURENCO MARQUES.—August 25th. Port and Railway Administration. Five floodlighting projectors (8,800 c.p. each). (A.Y. 11860.)*

Rowley Regis.—July 24th. Urban District Council. Electrical installations in 146 houses. (July 14th.)

South Africa.—CAPETOWN.—August 30th. Electricity Department. Oscillograph, &c. (A.Y. 11869.)*
September 27th. 20-h.p. motor-alternator set for meter testing. (A.Y. 11896.)*
August 16th. 5,000 25-A single-pole ironclad service cut-outs. (A.Y. 11893.)* Overhead line material and street lighting spares. (A.Y. 11892.)*
JOHANNESBURG.—August 2nd. City Council. 10,000-kW steam turbo-alternator and condensing plant. (A.Y. 11876.)*
August 17th. Ten miles of bare copper cable for overhead transmission lines. (G. 12787.)* Thirty miles of braided copper conductors for overhead transmission line. (A.Y. 11894.)*

Turkey.—ISTANBUL.—August 16th. Department of Posts, Telegraphs and Telephones. Iron telegraph wire. (G.Y. 12748.)*
August 19th. 60 tons of copper wire and 5,000 copper sleeves. (G.Y. 12747.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Bedford.—Electricity Committee. Recommended. Oil filtration plant (£184).—Hopkinsons, Ltd.

Cardiff.—Installation of electric lighting and power at the new Roath Dock Mills of Spillers, Ltd.—Page & Stibbs.

Croydon.—Electricity Committee. Recommended. Circulating water piping for new cooling tower (£3,990).—Babcock and Wilcox, Ltd. Electric feed pump for boiler house (£2,079).—G. & J. Weir, Ltd.
Highways Committee. Recommended. Traffic signals. Automatic Electric Co., Ltd.

Farnworth.—Urban District Council. Accepted. L.p. cables.—Edison Swan Electric Co., Ltd. Transformer.—Electric Construction Co., Ltd.

Hyde.—Housing Committee. Accepted. Installation of electric lighting in thirty-eight houses on Back Bower Estate.—Burke & Co., Ltd.

Ilford.—Electricity Committee. Accepted. Switchgear for Goodmayes sub-station (£150).—Crompton Parkinson, Ltd.

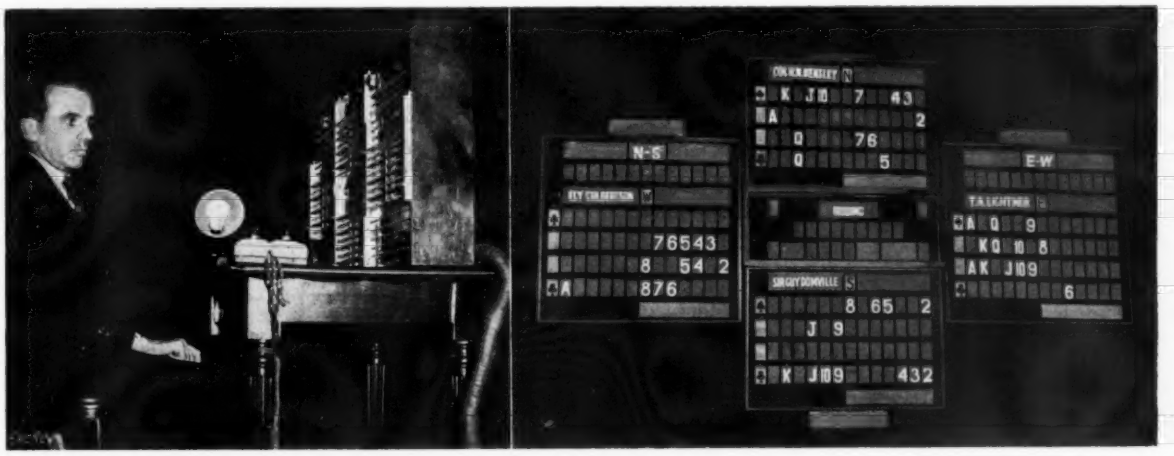
London.—MILL HILL.—Electric lighting installation in a portion of St. Joseph's College.—F. R. Garrod.
[This notice was inadvertently placed in the "Contracts Open" section of our last issue.]
HACKNEY.—Works Committee. Recommended. Batteries for electric vehicles.—Britannia Batteries, Ltd.; Portable Electric Power Co., Ltd.
STOKE NEWINGTON.—Electricity Committee. Recommended. L.p. switchgear (£487).—Ferguson, Pailin, Ltd. Two 500-kVA transformers (£453), and one 250-kVA transformer kiosk (£438).—General Electric Co., Ltd.
FULHAM.—Electricity Committee. Recommended. 300-kVA transformer (£254).—British Electric Transformer Co., Ltd. Meters.—Measurement, Ltd.; Aron Electricity Meter, Ltd.
BATTERSEA.—Electricity Committee. Accepted. Panel and three recorders (£144).—General Electric Co., Ltd. Two recorders (£47).—Everett Edgcumbe & Co., Ltd. Extension of transformer kiosk at Dickens Street (£238).—Ferguson, Pailin, Ltd.
WESTMINSTER.—Highways Committee. Recommended. Four traffic signal installations (£4,705).—Automatic Electric Co., Ltd.

Manchester.—Electricity Committee. Accepted. Dry batteries, &c., for flashlight lamps for twelve months.—General Electric Co., Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Installation of electric lighting at the Wharrier Street Schools (£774).—Falconar, Cross & Co., Ltd.

Swanscombe.—Housing Committee. Accepted. Electrical wiring at housing estate (four points at 37s. 6d. per house).—H. Wicks & Co.

Woodford.—Highways Committee. Recommended. Traffic signals (£338).—Automatic Electric Co., Ltd.



By means of this board, controlled by the apparatus seen on the left, a large audience has been enabled to follow the progress of the Anglo-American bridge match at Selfridge's this week **(See page 102)**

Boiler Inspection

The technical report of the British Engine, Boiler & Electrical Insurance Co., Ltd., for 1932 mentions the absorption during the year of the Manchester Steam Users' Association. Apart from details of breakdowns and explosions, the results of investigations into welding problems are again included. Of the boiler mishaps recorded, one only took place in an electric power station. The working pressure of the water-tube boiler concerned was 330 lb. per sq. in. One Murray fin tube in the furnace "water wall" burst due to overheating, its age being three months. The application of bend tests to welded joints is dealt with as well as failures of electric motor and blower shafts.

Notes

Electricity at a Bridge Match

During the course of the Anglo-American bridge contest at Selfridge's, Oxford Street, W., this week, the play has been watched by an audience in another room. This has been accomplished by means of an illuminated "board" upon which the hands held by each player are indicated. After the bidding has been completed the play of the cards is demonstrated by reducing the illumination of each card as it is played. The centre section of the board is reserved for the bidding and each pass, bid, or double can be clearly followed by the audience. Pictures of the board and the controlling apparatus appear on page 101.

Miners' Lamps

At the Institution of Mining Engineers' Conference in Edinburgh last week Professor W. M. Thornton contributed a paper on "A Miner's Gas Measuring Electric Lamp," in which he stated that the chief drawback urged against the miners' portable all-electric lamp was that it could not be employed to detect the presence of fire damp. There was a demand by all connected with coal-mining for more light underground, and now that the electric lamp could be made to measure gas quickly and accurately at any point, even against the coal, the high candlepower portable lamp appeared to be at the present time the most satisfactory solution of the problem.

The Electrical Association for Women

On July 13th, the Birmingham and Midlands Branch of the Electrical Association for Women held its final meeting of the current season. A party of about 100 members visited the Ucal Works at Cheltenham and later attended the Cheltenham Floral Fête in the Montpelier Gardens. The autumn session will commence in September.

The Institute of Transport

The council of the Institute of Transport has decided that the next Congress shall be held from June 6th to 9th, 1934, and has provisionally agreed upon Leeds as the venue.

The Physical Society at Cambridge

Members and friends of the Physical Society are to travel to Cambridge to-morrow morning for a tour of inspection of the works of the Cambridge Instrument Co., Ltd., after which they will be entertained to luncheon by the company. During the afternoon the visitors are to be conducted through some of the nearer colleges *en route* to the Cavendish Laboratory where a science meeting is to be held. Following an introductory address by Lord Rutherford, Dr. E. T. S. Walton, Mr. P. I. Dee, and Dr. M. L. Oliphant will lecture on artificial transmutations by high-speed protons, and the magnetic analysis of long-range alpha particles will be described by Mr. W. B. Lewis. Tea will be served in the laboratory, which will be open for inspection, and demonstrations have been arranged by Prof. Kapitza and Dr. Walton.

Cultivation by Electricity

In the course of a recent paper Dr. G. Friedmann, of the Italian Unione Nazionale Fascista Industrie Elettriche, gave some results of the use of electricity in the production of early vegetables and flowers. The tests were made in the upper valley of the River Po on three beds covering an area of about 480 sq. ft., of which one was heated by ordinary manure and the other two electrically by means of 220-V a.c. cables, the results being a marked economy in favour of the electrical method. In the case of the early vegetables produced under glass, the tests were made in a house covering an area of approximately 1,610 sq. ft. The earth was heated by circuits absorbing about 1.25 kW per 100 sq. ft., while the air in the houses was warmed by twenty-eight 300-W radiators, the air being maintained at a uniform temperature of between 68 and 77 deg. F. The tests showed that only about 0.5 kWh per sq. metre of bed was necessary, even in the coldest weather, to maintain a temperature of 68 deg. F. in the beds. Dr. Friedmann considers that, having regard to its relative low cost in relation to heating by manure and the ease with which the degree of heat may be controlled, electroculture is bound to develop and that power supply undertakings should encourage the movement by setting up favourable tariffs especially for night supplies.

Educational

A course in the Faculty of Science, Electrical Engineering Department, University of Birmingham, commences on October 2nd. (See our classified advertisements.)

A Tribute to the Late Mr. A. R. Everest

It was a simple matter to detach Everest from his surroundings in the world of engineering and to place him in some quiet private library. Fine acquiline face, intellectual forehead, silvered hair, kindly blue eyes, the student's pallor and the student's seriousness of manner; the dispassionate voice, yet with the scholar's keenness (as you quickly discovered) in getting at the truth of any matter with which he was dealing for the moment.

That is the way his picture first appeared to me twenty years ago. It has worn well, and I can keep it to the end. But, at first, I was somewhat perplexed by the question: What has this quiet gentleman to do with the rough-and-tumble of the engineering world? The answer soon became clear. Everest would have been an ornament to any society into which he entered. His gifts—albeit finely trained—were born in him and all his own. So he was the same in any company—quite impervious to the influences of environment. And as soon as our first reserve had broken down it was still in the picture that I should discover other little apt touches of colour. His first name was that of the most distinguished Father of the Church; he was a good Catholic; he was interested in education—the Rugby Local Committee, the education and welfare of the young men belonging to his great firm.

Turn aside to some of his work: What region of our world is not full of it? At the I.E.E., at the B.E.A.M.A., at the B.S.I., at the E.R.A.—he was the responsible leader in so much. The B.E.A.M.A. perhaps suited him best; he discovered himself and his work most easily there, for it willingly gave him all it had. He would have acknowledged that, and, in return, he gave it his whole self—his scholarly methods, his extreme care, all the higher simplicities. Which of us can fail to recall his gentle rebuke, his quiet expression of surprise that one did not remember the record—Minute No. 1001—on the same subject, made only a year before, only five years before!

Care, continuity, progress by the simple process of doing things right at first and then building on them and continuing to build. But all of it relieved by a quiet sense of fun—the humours of committees, the absurd positions in which they sometimes found themselves; relieved also by patience and consideration for everyone. A scholar and a gentleman, if ever there was one. We count ourselves lucky to have known him. We shall miss him, and the light that he carried. *Requiem æternum dona ei, Domine: et lux perpetua luceat ei.* X.

Appointments Vacant

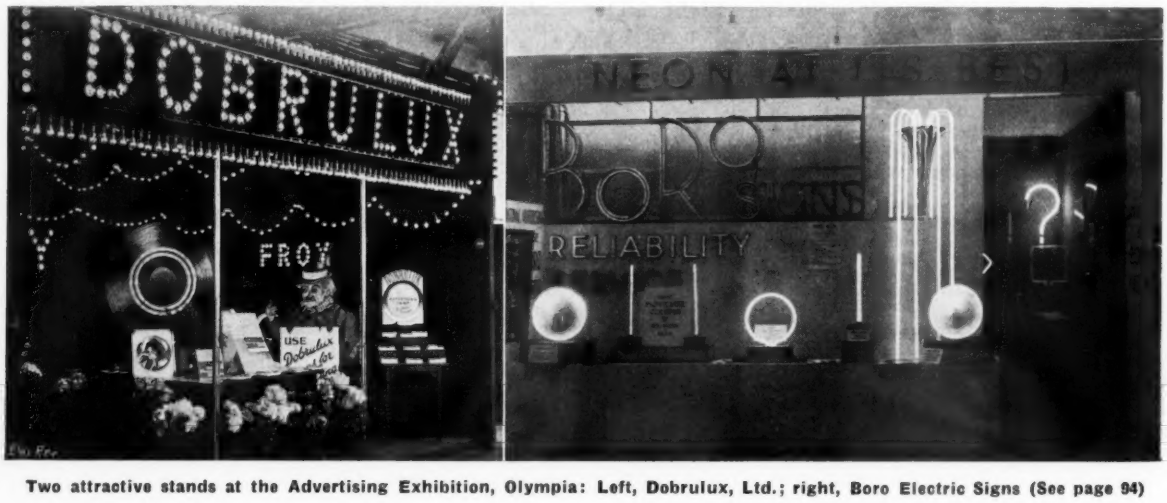
Temporary technical assistant for the Aldershot Electricity Department. Showroom manager and lady cook-demonstrator for Weymouth Electricity Department. (See our classified advertisements.)

Makers' Names Wanted

ATMOS motor; agents in this country for Messrs. Robbins and Myers, Springfield, Ohio.

RE-LYON battery tester.

DOMELITE insulating cloth or paper material.



Two attractive stands at the Advertising Exhibition, Olympia: Left, Dobrulux, Ltd.; right, Boro Electric Signs **(See page 94)**

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

The I.E.E. Council.—The result of the ballot to fill the vacancies which will occur on September 30th in the Council of the Institution of Electrical Engineers has been announced as follows:—President, Mr. P. V. Hunter, C.B.E.; vice-president, Mr. R. P. Sloan, C.B.E.; hon. treasurer, Mr. F. Rosling; ordinary members of the Council, Messrs. P. Dunsheath, D.Sc., W. McClelland, C.B., C. G. Morley New, C. Rodgers, O.B.E., Johnstone Wright, E. W. Moss (associate member), and V. Z. de Ferranti (associate). All these were Council nominees except Mr. C. Rodgers, who is secretary of the British Electrical & Allied Manufacturers' Association. Portraits of the other gentlemen mentioned appeared, with brief biographies, in our issue of June 9th (p. 808).

Loughborough College.—BRITISH EMPIRE SCHOLARSHIPS.—Awards of British Empire Scholarships in the Faculty of Engineering, Loughborough College, have been made to the following: Messrs. A. E. Hawke, M. Soar, C. E. Surman, M. G. Sayer, J. W. Norris, A. A. Young, J. Hollingshead, H. M. Sarstedt, F. J. W. R. Muller, and K. H. Clowes. The governors have also awarded three partly used scholarships to Messrs. A. Evans, J. O. Kent, and M. S. Spickernell. These scholarships are open to all British subjects resident in any part of the Empire and are of the value of £75 per annum.

The I.E.E. Overseas Conversazione.—Last year's innovation having evidently met with approval, the second conversazione of overseas members of the Institution of Electrical Engineers was held at headquarters on Wednesday evening, July 12th. After the formal reception by Prof. E. W. Marchant, D.Sc., president, who was supported by members of the Council, the visitors and their ladies adjourned to the lecture theatre to hear short addresses by Mr. C. C. Paterson on luminous discharge tube lighting and Mr. N. Ashbridge on Empire broadcasting. The subsequent reunion in the library was enlivened by a demonstration of discharge tube phenomena, "staged" by Messrs. C. C. Paterson and H. G. Jenkins; an exhibit of modern radio transmitting and receiving valves, by courtesy of the British Broadcasting Corporation; and a demonstration of interference with broadcasting caused by electrical apparatus, arranged by the Engineering Department of the General Post Office. The gathering of over 150 included members from New Zealand, Australia, the Federated Malay States, India, and Ceylon, Chile, Hong Kong, South Africa, Brazil, Egypt, Shanghai, Buenos Aires, Singapore, Russia, Greece, France, and Switzerland. Photographs of some of those present are reproduced on page 87.

Mr. and Mrs. E. Poole

The accompanying picture shows Mr. and Mrs. E. Poole, who were present at the function. Mr. Poole recently retired from the position of assistant borough electrical engineer of Durban. He has been a contributor to the ELECTRICAL REVIEW for a number of years.

Mr. J. W. Stelling, late telephone traffic superintendent at Southampton, who has retired after forty-six years' service, has been presented by his colleagues with an easy chair, and a cut-glass trinket set for his wife.

The Rev. John Harper, a son of Mr. H. R. Harper, chief engineer to the Victorian Electricity Commission, and himself an electrical engineer, has just been ordained in Melbourne and has left for the mission field in Tanganyika. In 1926 he obtained the degree of B.E.E. of Melbourne University, and soon afterwards came to England, and was employed by the Metropolitan-Vickers Electrical Co., Ltd. He returned to Australia in 1929.

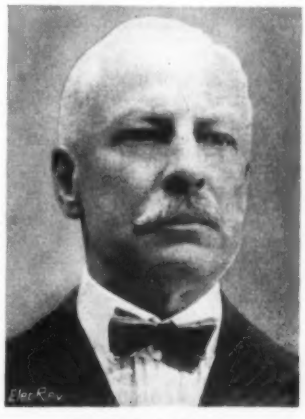
A.S.E.E. Awards.—Awards have been made in the two main competitions held by the Association of Supervising Electrical Engineers during last session. Under the Meetings Discussion Award the following were successful, as we reported last week: Members' first prize, £5 5s.—Mr. C. W. Bullock; members' second prize, £2 10s.—Mr. E. H. Whatton; and associates' prize, £2 10s.—Mr. J. W. Hutchings. In connection with the Highfield Shield Competition for 1932-3, under which papers are submitted dealing with the electrical industry and/or the Association, the following awards have been made: Members' first prize and shield, £5 5s.—Mr. B. B. Baker ("A Few Hints on Workshop Maintenance"); members' second prize, £3 3s.—Mr. W. R. Durtnall ("Electrical Installation of a Medium-size Cinema"); members' third prize, £2 2s.—Mr. R. W. Whitley ("Freak Tendering"); associates' first prize, £3 3s.—Mr. J. W. Hutchings ("A Case for Compulsory Wiring Regulations"); associates' second prize, £2 2s.—Mr. A. D. Gooding ("Food for Thought—Electricity in New Suburban Buildings"). The prize fund for the shield competition was contributed by Sir William Noble, Callender's Cable & Construction Co., Ltd., and the General Electric Co., Ltd.

Members of the sales organisation of Messrs. J. H. Tucker & Co., Ltd., who attended the annual sales conference held at the company's works, Tyseley, Birmingham, on June 30th and July 1st

Mr. H. Bailey, who for the past nine years has represented Messrs. Falk, Stadelmann & Co., Ltd., both in London and various parts of the country, has relinquished his position with the company. His address is 16, Connaught Gardens, N.10.

Mr. M. F. G. Wilson, M.Inst.C.E., who has been chairman of the Main Committee and chairman of the General Council of the British Standards Institution in all for the past five years, has retired in accordance with the by-laws, and **Mr. E. J. Elford,** M.Inst.C.E., borough engineer and surveyor of Wandsworth, past-president of the Institution of Municipal and County Engineers, and chairman of the Building Divisional Council, has been elected to succeed him as chairman of the General Council for the next twelve months.

Mr. S. J. Goddard, vice-president of the Western Union Telegraph Co. in England, is retiring, under the age-limit rule of the company, at the end of the current month. Born in 1863, Mr. Goddard was educated at Rottingdean and Uppingham, and after some years in the office of some leading London chartered accountants joined the National Telephone Co. in 1892, and was appointed head of the Audit Department. At the time of its transference to the Post Office in 1911 he was general superintendent, and when the matter went to arbitration took an active part in the preparation of the company's case. In January, 1913, he was appointed European Representative of the Western Union Co., and in 1920 was promoted to the position of vice-president. He carried out the amalgamation of the staffs, methods, and offices of the Anglo-American Telegraph Co., the Direct United States Cable Co., and the Western Union Co., and successfully concluded negotiations with the French Government in 1927 for the Havre cable landing, giving the Western Union direct communication between France and the United States. He also carried through negotiations with the Dutch and Belgian Governments for the opening of the Western Union offices in Holland and Belgium, and represented the company at three International Telegraph Conferences, held in Paris in 1925; Brussels, 1927; and Madrid, 1932. Mr. Goddard is a member of the Hert-



Mr. S. J. Goddard

fordshire County Council, and is a representative of the Council on the local Advisory Committee of the London and Home Counties Joint Electricity Authority. He has served for a number of years on the Post and Telegraph Committee and the Telephone Advisory Committee of the London Chamber of Commerce.

Obituary

Mr. J. H. Bowden.—The death of Mr. John Horace Bowden, M.I.E.E., M.I.Mech.E., general manager and chief engineer of the Poplar Borough Council's electricity undertaking, occurred on July 14th at his residence, Three Gables, Baring Road, Lee, S.E. He had been in ill-health (heart trouble mainly) for three years and had not been able to fulfil the duties of his position since October last year. Mr. Bowden was born in 1875 so was fifty-seven years of age. He was educated at Bloxham School, Victoria University, and served a seven-year apprenticeship with the Great Central Railway, subsequently becoming one of its assistant engineers. He was with the Brompton & Kensington Electricity Supply Co., Ltd., for three years as engineer, and later for between three and four years was generation engineer with the South Metropolitan Electric Supply Co. Then followed his appointment with the Poplar Borough Council, to the building up and extension of whose electricity supply undertaking he devoted the greater part of his career—thirty years. He was a member of the Associated Municipal Electrical Engineers from its inception and he had contributed papers to the proceedings of the I.M.E.A. We share with Mr. Bowden's friends their deep regret that he did not live long enough to clear up the difficulties in connection with the Poplar undertaking which formed the subject of an inquiry some months ago. The serious worry which the series of events entailed for him is stated to have been heart-breaking and to the last he protested his innocence. Sympathy with Mrs. Bowden and the family is widespread. His son, Mr. J. H. Bowden, is managing director of Bowmak, Ltd., electrical, marine and mechanical engineers, of Victoria Street, S.W. The funeral service took place on Tuesday morning at St. Augustine's Church, Grove Park, S.E., and the interment followed at Hither Green Cemetery. Those present included members of the Poplar Borough Couucil, representatives of the Poplar Electricity Department staff, and many old friends in the electrical industry, including a number of London station engineers and members of the A.M.E.E., of which he was a past-president. Among these were Messrs. G. Usher (International Combustion), D. Wilson, R. Spiers, J. Mercer (G.E.C.), W. Jackson, A. Barge, W. J. Allbright (South London Electric Supply Corporation), C. Bradshaw, E. M. Lacey, W. Wilde (late of Babcock & Wilcox, Ltd.), W. M. Moir, A. P. Hope, L. Bowden, A. Bowden, K. Spearing, F. Thorne, H. Heckford (borough surveyor, Poplar), G. Waterfield Stewart (Johnson & Phillips), Major Heenan, and Dr. W. A. Young (M.O.H., Poplar).

The late Mr. J. H. Bowden

Mr. B. Hawke.—The death occurred in St. Thomas's Hospital on July 16th, after a sudden illness, of Mr. Burton Hawke, for thirty-seven years manager of the Leyton works of the London Electric Wire Co. & Smiths, Ltd.

Mr. V. P. B. Stewart.—The death occurred in London on July 13th, at the age of 51, of Mr. V. P. Beardmore Stewart, C.B.E., a director of William Beardmore & Co., Ltd., and other companies.

Mr. A. R. Everest.—The death occurred on Saturday last, at his residence, 46, Clifton Road, Rugby, of Mr. Augustine Robert Everest, consulting engineer to the British Thomson-Houston Co., Ltd. He had been unwell for some time, but his death came as a shock to his friends. Mr. Everest, who was sixty-seven years of age, was born at Lymington, Hants, in 1866, was educated at King's College, London, studying under Professor Silvanus Thompson, and served his apprenticeship with Siemens Bros. & Co., Ltd., at Woolwich. In 1887 he joined the engineering staff of the P. & O. Steamship Co., and made several voyages to the East and Far East. Two years later he went to America, into the service of the Thomson Electric Welding Co., Lynn. In 1896 he joined the Thomson-Houston Co. (now the General Electric Co. of Schenectady), but he returned to England in 1905 to join the engineering staff of the B.T.-H. Co.

[*Elliott & Fry*
The late Mr. A. R. Everest

From then until his appointment in 1914 as consulting engineer to the engineering and manufacturing departments of the company at Rugby he was chief designer of alternating-current apparatus and chief adviser on tests and investigations of insulating materials. Among the many societies and committees to which Mr. Everest gave his services may be mentioned the B.E.A.M.A. Standardisation Committee, the B.E.A.M.A. Main Research Committee, the Electrical Industry Committee of sub-committees of the British Standards Institution, the Council of the British Electrical and Allied Industries Research Association, the I.E.E. Wiring Regulations Committee and several sub-committees; the International Relations Committee of the I.E.E., and the International Electrotechnical Commission. He was a member of the I.E.E., the American I.E.E., the Faraday Society, and the Institute of Radio Engineers. Mrs. Everest and her family have the sympathy of a very large circle of electrical men with whom her late husband was in constant touch and collaboration.

Will.—Mr. Robert Orsettich, of the General Electric Co., Ltd., left £12,840 (net personalty £10,620).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Electrical Units, Ltd.—Private company. Registered in Dublin, July 7th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, and manufacturers of and dealers in apparatus used in connection with the generation, distribution, supply, accumulation and employment of electricity and wireless waves, and of machinery of all kinds, &c. The subscribers (each with one share) are: R. A. Bullock, 6, Beaufort Villas, Rathfarnham, Dublin; and A. P. Blake, Killiney View, Newtown Park, Blackrock, Dublin.

B. & B. Tate, Ltd.—Private company. Registered July 12th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electrical, mechanical, domestic and radio engineers and contractors, and sellers of all articles pertaining thereto, &c. The directors are: C. L. Bunt and Mary J. Bunt, both of 2, Ascott Avenue, Ealing, W.5; S. M. Benn and Elinor Benn, both of 10, Duppas Hill Road, Croydon. Secretary: S. M. Benn. Registered office: 31, Bond Street, Ealing, W.

Radio Reconstruction Co., Ltd.—Private company. Registered July 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in television and radio receiving and transmitting apparatus, instruments and accessories, &c. The directors are: Ernest L. Gardiner and Mrs. Florence B. E. Gardiner, both of 104, Regents Park Road, N.W.1. Registered office: 45, Conduit Street, W.1.

Coventry Radio Factors, Ltd.—Private company. Registered July 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of wholesale dealers in radio and electrical goods carried on by Charles Payne, Ltd., at Star Yard, Earl Street, Coventry. The directors are: C. W. Payne, 152, Woodside Avenue, Coventry, and Harriet Hutt, 89, Wallace Road, Keresley, Coventry. Registered office: 1/3, Star Yard, Earl Street, Coventry.

Gilbert Industries, Ltd.—Private company. Registered July 10th. Capital, £200 in £1 shares. Objects: To acquire the business of wireless and electrical engineers carried on by L. C. E. Gilbert and J. G. Tinley at 519, London Road, Westcliff-on-Sea. The permanent directors are: L. C. E. Gilbert, 519, London Road, Westcliff (managing director), and J. G. Tinley, Lornea, Clatterfield Gardens, Westcliff. Registered office: 14, London Road, Southend-on-Sea.

Grippall Electrical Products, Ltd.—Private company. Registered June 28th. Capital, £300 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in gramophones, accumulators and batteries, wireless and electrical components, electricians, &c. The first directors are: J. E. P. Rigaut, 15, Ferme Park Mansions, Crouch End, N.8, and R. A. Simmons, 172, Tufnell Park Road, N.7. Registered office: Albert Works, Spencer Road, N.8.

Erimus Electrical Factors, Ltd.—Private company. Registered July 3rd. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, engineers, factors, general merchants and manufacturers, workers of and dealers in electricity, &c. The permanent directors are: E. I. Lawrence and Mrs. Mabel Lawrence, both of 34, Beechgrove, Linthorpe, Middlesbrough. Secretary: Sydney N. Warren, 18, Sycamore Road, Linthorpe, Middlesbrough.

Returns of Electrical Companies

British Electric Transformer Co., Ltd.—Capital, £1,000,000 in 190,625 preference and 375,000 ordinary shares of £1, and 1,737,500 ordinary shares of 5s. each. Return dated May 11th, 1933. 190,625 preference and 40,000 5s. ordinary shares taken up. £176,518 12s. 6d. paid on 176,518⅝ preference shares. £24,106 7s. 6d. considered as paid on 14,106⅝ preference and 40,000 5s. ordinary shares. Mortgages and charges, £143,178.

Edison Swan Cables, Ltd.—Capital, £150,000 in 100,000 preference shares of £1 and 200,000 ordinary shares of 5s. Return dated April 11th, 1933. 900 preference and 200,000 ordinary shares taken up. £50,900 paid. Mortgages and charges, £200,000.

Armorduct Cable Co., Ltd.—Particulars filed of £2,500 debentures authorised June 30th, 1933, charged on the company's undertaking and property, present and future, including uncalled capital (subject to debentures already issued), the whole amount being now issued.

John Shaw & Co. (Electrical), Ltd.—Debenture, dated July 4th, 1933, to secure £500, charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Branch Nominees, Ltd.

Chelsea Electricity Supply Co., Ltd.—Capital, £460,000 in 430,000 ordinary and 30,000 preference shares of £1. Return dated April 20th, 1933. 427,864 ordinary and 30,000 preference shares taken up. £218,850 paid on 188,850 ordinary and 30,000 preference shares. £239,014 considered as paid on 239,014 ordinary shares. Mortgages and charges, £72,180.

Tamworth District Electric Supply Co., Ltd.—Particulars filed of debentures to secure £50,000 and bonus of 2 per cent. authorised July 4th, 1933, charged on the company's undertaking and property, including uncalled capital, the amount of the present issue being £35,000.

Llanidloes Electric Light Co. (1926), Ltd.—Capital, £5,000 in £5 shares. Return dated May 4th, 1933. 565 shares taken up. £2,635 paid, £240 considered as paid. Mortgages and charges, nil.

Brentford Electric Supply Co., Ltd.—Capital, £75,000 in £1 shares. Return dated March 7th, 1933. All shares taken up. £75,000 paid. Mortgages and charges, nil.

Jarrow & District Electric Traction Co., Ltd.—Capital, £60,000 in £1 shares. Return dated April 25th, 1933. 59,934 ordinary shares taken up. £49,945 paid, £9,989 considered as paid. Mortgages and charges, nil.

City Notes

The Atlas Electric & General Trust, Ltd., held its annual meeting on July 13th. Mr. W. Sandford Poole (chairman), who presided, in the course of his speech, said that the fall in the values of the products of Uruguay in external markets, aggravated by the decrease in its purchasing power and by the restrictions placed on imports, had resulted in the checking of commercial activity, and in increasing unemployment. This naturally reacted on the traffics of the tramways of their subsidiary, the Sociedad Commercial de Montevideo. Since February, 1927, negotiations had been in progress for the amalgamation of the two tramway systems now owned by the subsidiary and a general revision of concessions under a new charter. Permission for the general use of tracks, overhead lines, and rolling stock of the two systems had not been granted up to the present time. In consequence the company had been placed at considerable disadvantage in operating. Unfair competition from omnibuses still continued, and a memorandum was presented to the Municipal Council of Montevideo in July, 1932, suggesting that the various concessions of the tramway companies should be revised, amalgamated, simplified, and extended to co-ordinate the whole of the passenger transport of the city. Furthermore, an agreement was under discussion between the company and the board of the State electric power houses for the taking of electric power from the State for the operation of the tramways. Negotiations were at present in progress for the settlement of these matters. While he could not foresee any great improvement in their revenue until their Uruguayan subsidiary yielded a reasonable return on the capital invested in it, the position was distinctly better than last year in that the valuation of their general investments showed an improvement of 10 per cent.

India Rubber, Gutta Percha & Telegraph Works Co., Ltd.—A general meeting of the holders of the company's 5 per cent. bearer debentures was held on July 13th to consider a proposal to extend the date for the redemption of the debentures from 1936 to 1972. In explaining the proposals, Mr. B. H. Binder (chairman) said that in each of the first six months of the current financial year the company's turnover had been less than in the corresponding period of the previous year. Since then there had been a marked increase in sales, which was partly seasonal, and the order book figures now exceeded those of the comparable period of last year, although in actual sales they were still behind-hand. Notwithstanding further economies made, it was not likely that the losses already incurred would be fully offset by the profits of the seasonal good months, and therefore it was inevitable that the current financial year would close with a loss. If the proposed scheme was not passed and the company continued alone, there would have to be a greater improvement in its operating results than he could at present foresee to enable the obligation to be met in 1936. After answering several questions, the chairman said that the debentures represented at the meeting did not constitute the required quorum, and therefore the meeting would stand adjourned until August 3rd.

The Aron Electricity Meter, Ltd.—Presiding at the annual meeting held on July 17th, Mr. H. Kahn (chairman) said that the figures for the year under review showed that considerable expansion had taken place in their meter business. Their latest meters had proved an unqualified success. With regard to the outlook for 1933, so far as the results of the London meter business were concerned, the first 3½ months of the current year had shown a marked improvement over the corresponding period of 1932. There were at present no signs of improvement in the taximeter business. In respect of the Austrian company conditions were unchanged, and in view of the chaotic financial, commercial and political conditions of that country a further loss during the current year could not be avoided. They were carrying on, nevertheless, in the hope of an eventual improvement, for if they closed down and were able to sell the factory it would be impossible to remit the proceeds to London.

Electro Chemical Processes, Ltd., reports a net loss for the year ended March 31st of £10,065, increasing the debit at profit and loss account to £99,594. The loss for 1931-32 was £38,454. The report states that the improvement effected during the year was continued during April and May last, and the operations for those months show a profit, after providing for the usual expenses, but not for depreciation, which cannot be properly calculated pending the revaluation of assets in connection with the reconstruction proposals which will be submitted in due course.

Falk, Stadelmann & Co., Ltd., report a profit for the year ended March 31st, including income from and profit on realisation of investments, of £78,382, as compared with £100,776 in the preceding year, out of which £11,290 has been set aside for income tax. The ordinary dividend is maintained at 5 per cent., general reserve receives £5,000, and £2,500 is contributed to the staff pension and benevolent fund. The balance carried forward is £16,488. Last year a 5 per cent. capital bonus was distributed in addition to the cash dividend.

The Musselburgh Electric Light & Traction Co., Ltd., reports a profit for 1932 of £6,313, as against £11,674 in 1931, which with £405 brought in makes £6,719. The electricity undertaking reserve and renewals account receives £6,019, depreciation absorbs £195, and the costs re sale of tramway undertaking written off were £76, leaving £428 to go forward. The losses incurred on the sale of the tramway undertaking and certain assets of the electricity undertaking appear at £133,037 in the balance sheet.

Thomas de la Rue & Co., Ltd.—Presiding at the annual meeting on July 12th, Mr. S. Lambert said that the company was now in the front rank so far as the plastic moulding trade was concerned, and was getting a substantial share of the best class of orders. Their general business was on a sounder and broader basis than it had been at any time since he had been associated with it

The Llandudno & Colwyn Bay Electric Railway, Ltd., reports a surplus for 1932 of £64, as against a deficit of £1,734 for the preceding year. A scheme of arrangement for dealing with secured loan and debenture stock and the reorganisation of capital has been prepared, the adoption of which the company recommends.

The Associated Gas & Electric Co. is submitting to debenture holders a plan of rearrangement of the capital. Debenture holders are offered three options whereby they may voluntarily exchange their present fixed-interest debentures for any one, or a combination of other, securities.

The National Gas & Oil Engine Co., Ltd., reports that in view of the continued trade depression the directors are unable to recommend an interim dividend on the preference shares. The matter will be reconsidered at the end of the year upon the completion of the accounts.

The Nico Light Co., Ltd., reports a loss of £200 for the year ended March 31st last, after transferring £750 from bad debts account. This is deducted from the balance brought in, leaving £874 to go forward.

The Jersey Electricity Co., Ltd., reports a net revenue, for 1932, including £3,746 brought in, of £12,925. The ordinary dividend is maintained at 10 per cent. and £3,900 is carried forward.

The Notting Hill Electric Lighting Co., Ltd., has announced an interim ordinary dividend at the rate of 8 per cent. per annum (same).

The Chelsea Electricity Supply Co., Ltd., has announced an interim dividend of 3 per cent., less tax, on the ordinary shares (same).

The Telephone & General Trust, Ltd., has announced a dividend of 3½ per cent. actual, less tax, on the preferred ordinary shares for the half-year ended June 30th.

W. & T. Avery, Ltd., report a profit for the year ended March 31st last, including £54,798 brought in, of £150,310, as compared with £156,290 in 1931-32. The ordinary dividend is maintained at 15 per cent. and £59,124 is carried forward.

Stocks and Shares

TUESDAY EVENING.

WITH the World Economic Conference coming to at least a temporary end within the course of the next few days, and without its having accomplished any work which is likely to prove of immediate service to trade or to finance, it is not surprising to hear some measure of disappointment expressed in the Stock Exchange at the failure of the delegates to achieve some kind of practical result. It must be repeated that the Stock Exchange, and probably the City at large, built no very high hopes upon what this Conference would be likely to do. On the other hand, nobody expected to find President Roosevelt turning down—to use a colloquialism—every effort to discover a solution by which international currency questions might be resolved. It was thought that America would be anxious to add some solid contribution to this particular aspect of international difficulty, but the President has made it clear that he entertains no present intention of joining hands with the rest of the world in a real effort to stabilise currencies upon an international basis.

The result is that the American exchange has been flying about as erratically as a googly ball and that the Americans, evidently apprehensive of their own currency, have been buying British stocks and shares in such a manner as led to an acute shortage of ordinary shares, and to a general rise

in prices. Speculation and gambling have hastened side by side with investment to acquire British stocks. The movement has become somewhat dangerous, and has called for warning from responsible quarters. It may be observed that none of the gambling counters, at present popular, happens to figure among the stocks and shares included in our lists. The investment demand already quoted has played its part, however, in bringing about the appreciation in prices which has been a Stock Exchange feature during the present month of July.

Electric Railway Stocks

The substitution of five new London Passenger Transport Board's stocks for the 45 issues of the amalgamated companies was attended by an outburst of speculation in the "C" issue of the new authority. At the start of dealing a fair amount of the "C" stock changed hands at 75 and thereabouts. Within a very short time the price rose to 81½. At this level mathematical calculations of the relative values of this stock and the £1 shares of the Underground Electric Railways led to purchases of the latter against sales of the former, whose price receded to 79½. Undergrounds strengthened to 24s. 6d.

Electricity Supply Shares

Provincial electricity supply shares are the firmest in their own group, the London issues showing hardly any change. Most of the Londoners are now ex dividend, and reference to our share list will show that the shares yield an average of rather less than 4½ per cent. on the money. Electric Supply Corporation at 68s. 9d. are ½ up. Clyde Valley, Lancashire Light & Power, and Electrical Distribution of Yorkshire show improvements at 37s. 6d., 32s., and 45s. respectively. Urban ordinary hold the gain, to 38s. 9d., that followed upon the offer made to shareholders by Edmundson's Electricity Corporation. Northamptons have advanced to 50s. 9d. Chiswick ordinary at 46s. 9d. and Hendons at 50s. 9d. are firmer.

Of the overseas companies' shares, Victoria Falls ordinary maintain their substantial rise at 91s. 3d., ex dividend and bonus.

Manufacturing and Equipment

Telegraph Constructions at 22s. 6d. and Johnson & Phillips at 22s. have both put on 3/16. The market is scantily supplied with floating stock and a moderate demand led to what, in shares at these prices, are considerable advances. Speculation has been busy with English Electrics: the ordinary at 11s. 3d., and the preference at 13s. 9d. are higher by 3s. 9d. and 1s. 3d. respectively. Ever-Readys keep hard at 13s. 9d. General Electrics hold their last week's rise to 45s. Siemens are better at 25s. 9d. Aron Meters are 1s. 6d. higher at 45s. Atlas at 11s. are 1s. up.

American demand rushed up the price of Electrical and Musical Industries, called in the Stock Exchange "Emis," to 18s., from which there was a reaction to 16s. New York speculators have been voracious buyers, also, of Canadian Marconis, amongst other industrials.

Cables and Wireless

A feature in the industrial market is the strength of Cables and Wireless preference, the price of which has spurted to 84½, showing a gain of 4 points on the week. The ordinary at 32 is 2½ up, and the "B" preference at 15 shows a gain of 2. The advances are due to the speculative anxiety to acquire any stock that is likely to be included in the American purview attracted to British industrials. At the same time, a more durable reason for the demand is the impression that trade and industry are certainly recovering, and that the communication companies are bound to benefit materially from any improvement in commerce. With the rise in the Cable stocks, Globe Telegraph ordinary sympathised, advancing to 12¼. Great Northern Telegraph were again better at 32½. Marconi Marines have caught New York's attention, and the price strengthened to 35s., a 3/16 rise. Canadian Marconi, as mentioned earlier, came in for strong support, and the price jumped to 14s. 3d. American Telephone and Telegraph is a dull market at 140: International Telephone & Telegraph rallied to 22.

Miscellaneous Matters

Debenture holders of the India Rubber Gutta Percha & Telegraph Works were not present in sufficient number to form a quorum at last week's meeting, and the proceedings were accordingly adjourned to August 3rd. The price of the ordinary shares is unchanged at 3s. 9d. Rubber shares have enjoyed a remarkable recovery on a rise in the raw material, New York being a heavy buyer of the produce. Cheers arose in the London Stock Exchange Market when rubber marked 5d. per lb. for six months ahead. It is a very long time since this figure has been seen on the market's blackboard. The Government announcement of a preferential duty upon oil produced from British coal led to sharp rises in the shares of the Imperial Chemical Industries. Amongst other shares to which Americans show partiality are Associated Electricals, and the price of the ordinary has risen 1s. 9d. to 22s. 6d. The iron and steel group is busy, without there being much change in quotations. The Stock Exchange is unusually well employed, and the fortnightly settlement which takes place next week will be one of the heaviest hitherto handled in 1933.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, July 18.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	73/3	—	4 1 9
Brompton Ordinary	1	8½	7	32/6	—	4 6 2
Central Electricity 4½% Deb.	Stock	4½	4½	105	—	4 5 9
Charing Cross Ordinary	1	8d	7	33/0	—	4 4 10
Chelsea	1	8¼	7	32/–	—	4 7 6
City of London	1	10	10	33/6	—	4 3 7
Clyde Valley	1	7	7	37/6	+1/8	3 14 8
County of London	1	10½	10½	53/9	—	3 18 1
Edmundson's 7% Pref.	1	7	7	30/–	—	4 13 4
Elec. Dis. Yorkshire	1	9	9	45/-	+1/8	4 0 0
Elec. Supply Corporation	1	11	11	68/9	+¼	3 4 0
Kensington Ordinary	1	8	7	32/6	—	4 6 2
Lancs Light and Power	1	7	7	32/–	+9d.	4 7 6
London & Home Counties 4½%Deb.	Stock	4½	4½	107	—	4 4 1
London Electric	1	9	7	32/6	—	4 6 2
Metropolitan	1	10	10	49/6	—	4 1 0
Midland Counties	1	7	7	37/6	—	3 14 8
Mid. Elec. Power	1	8	8	38/9	—	4 2 4
North Eastern Electric Ordinary	1	6	6	30/–	—	4 0 0
Do. 7% Pref.	1	7	7	32/6	—	4 6 2
Northampton	1	10	10	50/9	+9d.	3 18 9
Notting Hill 6% Pref.	10	6	6	13xd.	—	4 12 4
North Met. Elec. 6% Pref.	1	6	6	29/–	+6d.	4 2 9
St. James' and Pall Mall	1	8	7	31/6xd.	—	4 9 0
Scottish Power	1	8	8	36/3	—	4 8 2
South London	1	8½	7	33/–	—	4 4 10
Urban Ordinary	1	7	7	38/9	+1/8	3 12 2
Westminster Ordinary	1	8½	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/9	—	7 4 7
Yorkshire Elec.	1	8	8	42/6	—	3 15 3
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	90	—	4 9 0
Metropolitan	„	2½	1⅝	74	+2	—
Underground Electric	1	7	4½	24/6	+1/–	—
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	140	—	6 8 8
Anglo-Am. Tel. Pref.	Stock	6	6	107½	—	5 11 8
Do. Def.	„	1½	1½	26	+1	5 15 5
Cables & Wireless 5½% Pref.	„	2⅝	2⅝	84½	+4	3 5 4
Do. A 7½% Ord.	„	Nil	Nil	32	+2½	—
Do. B. Ord.	„	Nil	Nil	15	+2	—
Globe Tel. and T. Ord.	10	Nil	2½	12½	+½	2 0 10
Do. do. Pre.	10	6	6	12	—	5 0 0
Great Northern Tel.	10	20	20	32½	+1	6 3 0
Marconi-Marine	1	10	7½	35/–	+3/16	4 5 9
Oriental Telephone Ord.	1	12	12	2⅞	—	*4 3 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	5/9	—	—
Do. do. 2nd Pref.	5	Nil	Nil	6/3	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	14½	—	—
British Electric Traction Df. Ord.	„	5	5	410	—	—
Do. do. Pref. Ord.	„	8	8	135	—	5 18 5
Brazil Traction	100	—	—	16⅞	+⅛	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 19 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	20/–	+6d.	—
Mexico Trams, 5% Bonds	—	5	5	32½	—4	15 7 8
Mexican Light Common	100	Nil	Nil	15½	—	—
Do. 7% Pref	100	7	7	15	—	—
Do. 1st Bonds	—	5	5	70½	—	7 1 10
Victoria Falls Ord.	1	15	20	91/3	—	4 7 7
Yorkshire (West Riding)	1	Nil	Nil	10/–	—	—
MANUFACTURUNG COMPANIES.						
Assoc. Elec. Ord.	1	4	4	22/6	+1/9	3 11 2
Do. Pref.	1	8	8	28/3	—	5 13 3
Babcock & Wilcox	1	14	9	37/6	—	4 16 0
British Aluminium Ord.	1	5	5	31/3	—	3 4 0
British Insulated Ord.	1	15	15	72/–	—1/6	4 3 4
Brush Ord.	Stock	Nil	Nil	35	—	—
Callender's	1	15	15	3⅜	—	4 14 0
Do. 6½% Pref.	1	6½	6½	28/9	—	4 10 5
Crompton Parkinson Ord.	5/–	22½	—	18/3	—	6 5 7
Do. 8% Pref.	1	8	8	30/–	—	5 6 8
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nill	12/6	—	—
Enfield Cable Ord.	1	25	25	4⅜	–	5 9 9
English Electric	1	Nil	Nil	11/3	+⅛	—
Do. do. Pref.	1	Nil	Nil	13/9	+⅛	—
Ever Ready	5/–	35	35	29/3	—	5 19 8
Ferranti Pref.	1	7	7	24/3	—	5 15 8
G.E.C. Pref.	1	6½	6½	29/0	—	4 9 8
Do. Ord.	1	8	8	45/–	—	3 11 2
Henley's	1	30	30	6¾	—	4 16 0
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber	1	Nil	Nil	3/9	—	—
Johnson & Phillips	1	5	5	22/–	+3/16	4 11 0
Siemens Ord.	1	7½	6½	25/9	+9d.	5 1 0
Telegraph Construction	£1	Nil	Nil	22/6	+3/16	—

*Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1931

29640. "Electrodes for mercury arc lamps for the production of ultra-violet light." Hanovia Chemical & Manufacturing Co. June 16th, 1931. (394367.)

31998. "Electric furnaces." M. Van Marle and G. W. B. Electric Furnaces, Ltd. November 18th, 1931. (394313.)

34400. "Illumination control system." Igranic Electric Co., Ltd. December 12th, 1930. (Addition to 28290/31). (394345.)

34657. "Sound-transmission, sound-recording, and sound-reproducing systems." A. D. Blumlein and Electric & Musical Industries, Ltd. December 14th, 1931. (394325.)

34724. "Inductance coils." B. S. Cohen, F. O. Barralet and E. D. Hebden. December 15th, 1931. (394327.)

34876. "Electric motor speed control systems." British Thomson-Houston Co., Ltd. December 16th, 1930. (394372.)

34894. "Sound-records and systems for recording the same." Marconi's Wireless Telegraph Co., Ltd., and H. J. Round. December 16th, 1931. (394328.)

35362. "Television receiving apparatus." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. December 20th, 1930. (394341.)

35426. "Electrical apparatus for measuring, indicating, protective, or other purposes." W. M. Thornton. December 22nd, 1931. (394355.)

35592. "Telephone systems." Automatic Electric Co., Ltd., and G. T. Baker. December 23rd, 1931. (394360.)

35596. "Mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. December 23rd, 1931. (394361.)

35597. "Electric distribution systems employing mercury-arc rectifiers." British Thomson-Houston Co., Ltd., and F. P. Whitaker. December 23rd, 1931. (394362.)

35602. "Electrically operated clocks." G. Wall and Associated Electrical Industries, Ltd. December 23rd, 1931. (394363.)

35745. "Loaded electric signalling conductors." W. S. Smith, H. J. Garnett, H. C. Channon, and E. W. Smith. December 24th, 1931. (Addition to 307087). (394384.)

35872. "Mechanism for, and method of, governing the speed of electric motors." Burroughs Adding Machine Co. January 12th, 1931. (394393.)

35898. "Split-core current transformers." Kabushiki Kaisha Yokogawa Denki Seisakusho. July 8th, 1931. (394394.)

35987. "Selector switches for use, for example, for transformer tap changing." General Electric Co., Ltd., and F. Booker. December 30th, 1931. (394397.)

1932

1650. "Electric suspension switches." A. Bonnella and G. J. Bonnella. January 19th, 1932. (394411.)

3827. "Electric transformers." H. G. A. R. Wilson. February 9th, 1932. (394425.)

5784. "Electric switching devices particularly for wireless sets." J. H. W. Lewis. February 26th, 1932. (394435.)

7309. "Speed regulators for electric motors." Igranic Electric Co., Ltd. March 12th, 1931. (394444.)

8137. "Decomposition and composition of pictures particularly in television." I.M.K. Syndicate, Ltd. April 14th, 1931. (394446.)

10135. "Tuning systems for wireless receiving apparatus." A. L. M. Sowerby and A. C. Cossor, Ltd. April 8th, 1932. (394457.)

11425. "Television receiving arrangement with Braun tube." M. Von Ardenne. April 24th, 1931. (Addition to 387536.) (394460.)

13118. "Method and apparatus for the electromagnetic separation of materials." R. C. Forrer-Jaggi Mines Domaniales de Potasse d'Allsace. May 8th, 1931. (394471.)

14241. "Electrical apparatus for producing a 'saw-tooth' potential." Dr. K. Schlesinger. May 20th, 1931. (394476.)

17138. "Electric condensers." General Electric Co., Ltd., and V. N. Halliday. June 17th, 1932. (394485.)

19988. "Electric discharge apparatus." W. Lehmann. July 20th, 1931. (394494.)

20245. "Television method." M. Von Ardenne. July 18th. 1931. (Addition to 8932/32.) (394496.)

22692. "Electric discharge apparatus." W. Lehmann. October 23rd, 1931. (Addition to 394494.) (394507.)

25979. "Radio-gramophone plug-switch valve-holder." C. Berwin and A. Berwin. September 19th, 1932. (394523.)

26292. "Superheterodyne receiver for wireless signalling." Hazeltine Corporation. February 13th, 1931. (Divided application on 32329/31.) (394364.)

26452. "Ignition distributors for internal-combustion engines." R. Bosch Akt.-Ges. October 13th, 1931. (394526.)

27849. "Electric switches particularly for regulating transformers." British Thomson-Houston Co., Ltd. October 8th, 1931. (394532.)

27972. "Magnet systems of electromagnetic devices for converting electrical oscillations into mechanical vibrations or inversely." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 23rd, 1932. (394533.)

30007. "Machines for inserting electric dry battery elements into cardboard or other containers." A. H. Stevens (H. A. Bumke Ges.). October 26th, 1932. (394552.)

30022. "Method for the electrothermic reduction of raw materials and apparatus therefor." P. L. J. Miguet and M. P. Perron. November 24th, 1931. (394553.)

30495. "Making of conductor joints in submarine cables having a thermo-plastic insulation." Norddeutsche Seekabelwerke Akt.-Ges. November 4th, 1931. (394556.)

30556. "Incandescent electric lamps." British Thomson-Houston Co., Ltd. October 30th, 1931. (394557.)

30690. "Electrical circuit-breakers." British Electrical and Allied Industries Research Association, W. B. Whitney, E. B. Wedmore and L. Gosland. February 1st, 1932. (Cognate applications, 30564/32, 36347/32, and 1234/33.) (Divided application on 27384/31.) (394560.)

32187. "Variable reactance devices." British Thomson-Houston Co., Ltd. November 13th, 1931. (394566.)

33934. "Cathode-ray tubes and apparatus incorporating the same." Telefunken Ges. für Drahtlose Telegraphie. November 30th, 1931. (394580.)

34354. "Telephone systems." Standard Telephones & Cables, Ltd. December 5th, 1932. (394585.)

35030. "Electric cleaning and polishing devices." E. Hoogland. December 9th, 1932. (Convention date not granted.) (394590.)

36906. "Television and like systems." Marconi's Wireless Telegraph Co., Ltd. January 6th, 1932. (394597.)

1933

2886. "Electric welding." British Thomson-Houston Co., Ltd. January 28th, 1932. (394610.)

4942. "Tap-changing gear for electric transformers and the like." English Electric Co., Ltd., and I. D. Campbell. February 17th, 1933. (394618.)

5085. "Electrodes for mercury-arc lamps for the production of ultra-violet light." Hanovia Chemical & Manufacturing Co. June 16th, 1931. (Divided application on 394367.) (394388.)

5191. "Electric switches or circuit breakers." International General Electric Co., Inc. February 18th, 1932. (394620.)

7608. "Electric gas-blast circuit-breakers." International General Electric Co., Inc. March 12th, 1932. (394628.)

9190. "Covers for electric accumulators." Britannia Batteries, Ltd. April 15th, 1932. (394633.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 12th :—

Ever Ready (lettering and design). No. 534603. Class 8. Dry batteries and cells (electrical), accumulators and electric gas lighters. No. 534604. Class 11. Lamps, dry batteries and cells, accumulators and coils (electrical), all for medical or dental purposes. No. 534605. Class 13. Electric lamps, lamp and torch cases, and electric bells. No. 534606. Class 14. Nickel-plated electric lamp cases.—The Ever Ready Co. (Great Britain), Ltd., Hercules Place, Holloway, N.7.

Droit. No. 541793. Class 8. High-tension batteries (not for medical purposes).—Gothic Electrical Supplies, Ltd., 13, Severn Street, Birmingham.

Vertex. No. 534580. Class 8. Electric regulating apparatus, ignition coils, fitted electric switchboards, electric cigar lighters, and braided metal-covered electric cables.—Die Scintilla Gesellschaft, Zuchwil, near Solothurn, Switzerland (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2).

Ultra-Vioscope. No. 539912. Class 8. Ultra-violet light apparatus for use in carrying out analytical examinations.—Griffin & Tatlock, Ltd., Kemble Street, Kingsway, W.C.2.

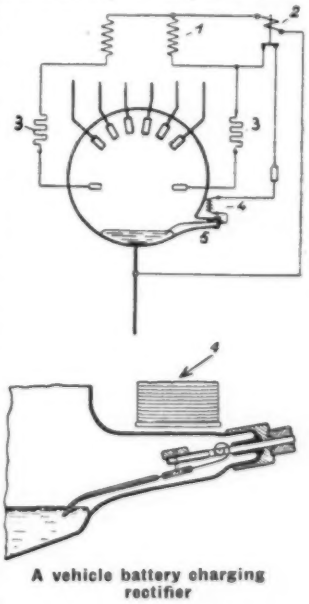
Transitone. No. 540437. Class 8. Radio receiving sets.—Philco Radio & Television Corporation of Great Britain, Ltd., 1, Argyll Street, Oxford Circus, W.1.

Eldorado. No. 542174. Class 13. Electric lamps (ordinary).—Leslie Bloom, 13, Newbold Street, E.1.

Varcos. No. 540465. Class 50. Electric insulating material and electric insulators.—H. C. & M. I. Pontet, 76, Duncombe Road, Upper Holloway, N.19.

Rectifiers for Charging Vehicle Batteries

The accompanying illustrations, from *Elektrotechnische Zeitschrift*, show the principle of the automatic ignition device used in a new mercury rectifier equipment developed by the Siemens-Schuckertwerke for the consecutive charging of two vehicle batteries. As soon as one battery is charged, the other is switched in circuit, and when this also is charged the rectifier is automatically shut down. The rectifier is of the glass-bulb type, and ignition is effected without tipping the bulb. A flexibly supported ignition rod 5, which normally dips into the cathode mercury, is attracted by a magnet coil when the rectifier is switched "on," thus producing an ignition spark and, at the same time, opening the magnet circuit. The rod 5 then falls back, and the action is repeated if the rectifier has not come into action. The current flows first from the excitation winding 1, through the relay contacts 2, striking coil 4, ignition electrode 5, and relay coil 2, back to 1. An ignition spark having been struck at 5, current flows from 1, *via* the resistances 3 and the cathode to the relay coil 2, which opens the relay contacts and thereby interrupts the ignition circuit. An average burning life of over 20,000 hours is said to be obtained from these rectifiers. Recent tests indicate that copper oxide rectifiers will also prove very useful in charging vehicle batteries; such rectifiers are capable of withstanding rough usage and a life exceeding 25,000 hours may be expected.



A vehicle battery charging rectifier

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alfreton.—Council offices, Cemetery Lane (electrical installation); R. E. Ward, surveyor, Council Offices.

Bath.—Block of shops and offices; A. Wills & Sons, builders.

Batley.—R.C. schools, Holtom & Fox, architects, Union Street, Dewsbury.

Birkenhead.—Welfare centre, New Ferry (£3,000); borough surveyor.

Birmingham.—Houses (45) for the Excelda Housing Society, near Bromford Lane (electrical installation); Henry Boot & Son, builders, Moore Street. Baptist church, Bunbury Road, Northfield, for the Rev. A. S. Campbell (£7,000). Offices, Pershore Road South, for the Co-operative Insurance Society, Ltd., 8, Bull Street (electrical installation); Merrick & Ellis, builders, Northfield. Shops, Bristol Road, near Tessall Lane; C. McWhirter, builders, Smallbrook Street. Shops, Glebe Farm Estate (electrical installation); Mr. Powell, architect, 115, Colmore Row. Shops, Tyburn Road, Tyburn (£5,500), electrical installation; A. Ford, builders, Solihull. Additions to premises of A. D. Fellows & Sons, Harborne Lane, Harborne (electrical installation); Geo. Webb & Son, builders, Handsworth. Additions to factory premises of Wilmot & Breeden, Ltd., Hay Mills (electrical installation); T. Johnson & Son, builders, Great Brook Street. Conversion of 754-756, Alum Rock Road, for Freeman, Hardy & Willis (electrical installation); Arnold & Son, builders, 34, Gold Street, Northampton. Extensions to factory premises of Parkinson Stove Co., Stechford (electrical installation); Wm. Street & Sons, builders, 184, Bristol Street.

Blackburn.—Houses (25), Brothers Street; borough engineer.

Blackpool.—Schools and hall, Marton (£20,000), for the R.C. managers; priest in charge.

Blyth.—Houses, Crawford Street; borough engineer.

Boston.—Houses (108); borough surveyor.

Bridgwater (SOMERSET).—Houses (81); borough surveyor.

Bristol.—Houses (100), Southmead Housing site; H. M. Webb, city surveyor, 51, Prince Street.

Brixworth (NORTHANTS).—Development of Rose Mount Estate; A. Hamson & Son, Ltd.

Burnley.—Town hall extensions (£6,500); borough surveyor.

Cambridge.—Extensions, Perse Boys' School, for the Governors; W. L. Raynes, clerk, 90, Regent Street.

Cannock.—Houses (52), Pye Green; U.D.C. surveyor.

Carlisle.—Lay-out for aerodrome, Kingston; Air Commodore Pitcher and city engineer. Alterations to Ridley's Hotel, Butchergate; H. E. Scarborough, architect.

Castleford.—Church, Airedale; R. A. Easdale & Son, local architects, County Chambers.

Caversham.—Houses (260) for the Workmen's Housing Association, Ltd., Bank Chambers, 329, High Holborn, London, W.C.

Cheshire.—School, Sale (£6,700), for County E.C.; F. E. Colman, builder.

Chesterfield.—Estate development, Mansfield Road; Brown & Turner. Extensions to Derby Road School for E.C.

Chippenham.—Houses (22), Borough Lands; borough surveyor.

Colchester.—Houses (47); H. Collins, borough engineer.

Croydon.—Houses (55), Malden Avenue; Steel & Howes, Farnley Road, S.E.25. School (500 places), Violet Lane, Waddon, for E.C.

Dagenham.—Houses (132); Pavitt Bros., builders, Purfleet.

Darlington.—Houses (£3,665), Sadberge; J. T. Dickinson and Sons, builders.

Dewsbury.—Additions to Jilling Ing Mills; S. Lyles, Son & Co., Ltd.

Doncaster.—Bus and trolley car garage, Leicester Avenue, Intake, for Corporation Transport department; F. Oscar Kirby, borough engineer, 2, Priory Place.

Dunston-on-Tyne.—Church, Dunston; A. Harrison, architect, 69, High Street, Stockton.

Edinburgh.—Additions and alterations to Colinton Hospital and reconstruction of Bangour Mental Hospital; E. J. McRae, architect, City Chambers.

Ellesmere (SALOP).—Houses (20); Griffiths Bros., builders.

Gateshead.—Houses (30), Carr Hill Estate; F. H. Patterson, borough engineer, Municipal Buildings, Swinburne Street. Church, near Appledore Gardens, for the trustees of the Bensham Road Congregational Church. Mental hospital; Gateshead, South Shields and West Hartlepool Corporations. Extensions to Hawks Assembly Rooms; R. Stephenson and Sons, builders, Kells Lane, Low Fell.

Gillingham.—Shops, 151-5, High Street; A. T. Batzer. School, Skinner Street; borough engineer.

Glasgow.—New premises for the Associated Scottish Newspapers, Ltd., 67, Hope Street; Keppie & Henderson, architects, 131, West Regent Street.

Gloucestershire.—Infirmary extensions, Cheltenham (£7,345); W. J. B. Halls, Ltd., builders.

Grantham.—Houses (122); borough surveyor. Administrative offices, Barford & Aveling, Ltd., engineers, Rochester.

Gravesend.—Alterations to 174-5, Windmill Street for Liptons, Ltd.; W. H. Dark.

Great Yarmouth.—Houses (120); H. A. Holmes & Sons, builders, Bath Hill.

Greenock.—Maternity hospital; burgh surveyor.

Halesowen.—Houses (25), Feldon Estate, for C. McWhirter.

Hebburn-on-Tyne.—Clinic, health department, and rating office (£6,850); J. Henderson, building superintendent.

Hereford.—Hall and houses, Garden City; Bettington & Son, architects, Palace Chambers.

Houghton-le-Spring (DURHAM).—Houses (24), Hall Lane Estate; V. J. Hunter, U.D.C. surveyor.

Irish Free State.—(CORK).—Houses (104), Griffin's Field, Gurranabraher; J. R. Boyd Barrett, architect, 61, South Mall.

Kidderminster.—Houses (20), Hoo Road; G. W. Williams. Extensions to St. John's Institute, Crowther Street; W. Warder.

Kirkcaldy.—Conversion of Mansion House into hospital for the trustees of the late John Hunter; W. Williamson, architect.

Lanarkshire.—Houses (120), electrical work, for C.C.; P. C. Smith, housing engineer, 13, Clydesdale Street, Hamilton.

London.—(BRIXTON).—Tenements, Vassall Road (£120,000); L.C.C. architect. (CHELSEA).—Improvements to Poor Law Institution and remodelling laundry (£28,000); L.C.C. architect. (DEPTFORD).—Tenements, Bate Place (£13,000); L.C.C. architect. (EAST HAM).—Internal reconstruction of Palace Theatre, High Street; Dixon & Braddock. (HAMMERSMITH).—Tenements (112), Wormholt Estate (£29,298); Rowley Bros., Ltd., Tottenham, N. (PLAISTOW).—Factory premises, High Street; Hooper, Cushen & Co., architects, Estates Office, Millwall, E.14. (POPLAR).—Houses, Ranwell Street (£41,000); L.C.C. architect. (SHOREDITCH).—Tenements (24), Whitmore Estate (£6,498); Rowley Bros., Ltd., Tottenham, N. (SOUTHWARK).—Town hall, extensions (£70,000); Yates, Cook & Darbyshire, architects. (STEPNEY).—Tenements, Caroline Street (£3,850); borough engineer. (TOOTING).—Reconstruction of premises, 236, Upper Tooting Road, S.W.17, for Hastings, Ltd., of Clapham Junction, S.W.11; H. Branch, architect, 25, Cheapside, E.C.2.

Manchester.—Cinema, Halls Crescent, Rochdale Road (electrical installations); David Walton & Co., builders, Clarendon Road, Pendleton. Extensions to premises, Fountain Street, Marble Street and Spring Gardens, for District Bank, Ltd. (electrical installations); Russell Building Co., Ltd., builders, 37, Princess Street.

Mapperley (NOTTS).—Extensions to the City Mental Hospital (electrical installations); T. W. Gordon, architect, Guildhall, Nottingham.

Middlesbrough.—Houses (28), Appleton Road; E. T. Sweeting, builder, Back Haymore Street, Linthorpe. Convent, North Ormsby; J. H. Hurst, architect, Hull.

Midlothian.—Alterations to Grammar School (£2,500); Master of Works, County Council, Edinburgh.

Newburn-on-Tyne.—Four shops, Westerhope; R. A. Gofton and Sons, builders, 41, Uplands, Monkseaton.

Newcastle-on-Tyne.—Additions to the Sanderson Home for Crippled Children; T. Curry & Sons, builders, Meldon Lane.

Northampton.—Children's home, Raunds (£3,500), for C.C. Schools, Corby, and Wellingborough, for County E.C.

Norwich.—Municipal buildings (£222,000); city engineer. School, Thorpe Hamlet (£8,721); R. G. Carter, Ltd.

Oldbury.—Houses (24), Fisher Road, for G. H. Smith.

Oldham.—Children's pavilion, Municipal Hospital (£6,583); borough surveyor.

Oxford.—Houses (134); J. Aston & Son, builders, Binley Road, Stoke, Coventry.

Pendleton.—Development of estate, Prestwich Garden City, for houses (electrical work); J. Lane & Sons, Ltd., Oakwood Estate, Swinton Park Road, Irlams-o'-th'-Height.

Pontefract.—Houses (40), Wakefield Road; Tennant & Smith, architects, Ropergate. Factory extensions, Mill Dam, for Wilkinson's, Ltd.

Portsmouth.—Houses (1,378); borough surveyor. Bank extension, Commercial Road; Barclays Bank, Ltd. Factory for Airspeed, Ltd., civic aerodrome (£2,400); city engineer.

Reading.—Houses (206), Whitley Estate; borough surveyor. Extensions, Park Hospital (£3,113); W. Rowland Howell, architect, 17, Blagrave Street.

Scarborough.—Houses (52), Northstead Estate; H. W. Smith, borough engineer.

Sheffield.—Extensions to Queen's Road Works for the Tramways and Motors Committee; W. Geo. Davies, city architect, Town Hall.

Southampton.—Baptist Mission Church (£5,500); H. Cawte & Sons, Ltd., builders, Shirley.

Southport.—Factory extension, Portland Street.—Dunn, Halliwell & Co.

South Shields.—Houses, New Simonside Estate, Newcastle Road; F. Wills. Reconstruction of premises for Jackson & Sons, Ltd., King Street and Market Place; Glass, Harrison & Ash.

Stockport.—Houses (20), Lancashire Hill (electrical installations), (£7,358); Thomas Davies & Son, builders, 20, Clwydd Avenue, Edgeley.

Stockton-on-Tees.—School, Hartburn, for Borough E.C.; director of education.

Stroud.—Houses (50); Wheatley & Sons, builders. Bazaar stores, King Street, for F. W. Woolworth & Co., Ltd., London.

Sunderland.—R.C. school (440 places); A. Harrison, architect, 6a, High Street, Stockton-on-Tees.

Swinton & Pendlebury.—Houses (210); U.D.C. surveyor.

Tilbury.—Houses (24); U.D.C. surveyor.

Torquay.—Aerodrome; K. D. MacGregor-Bowron, Marine Aero & Automobile Engineering Service, Paignton.

Tyldesley.—Houses (80), (electrical installations); F. E. Jones, surveyor, Town Hall.

Ulverston.—Houses (18), (No. 4 Scheme), Devonshire Road district; Surveyor, Theatre Street.

Wallasey.—Alterations to Sommerville Council School for E.C. (electrical installations); Lloyd & Cross, Ltd., builders, 57, Hamilton Square, Birkenhead.

Warwickshire.—School, Keresley, and extensions, Arley Central Schools (£9,900), for County E.C.; director of education, Leamington Spa.

West Hartlepool.—Houses (160); F. Durkin, borough engineer.

West Wickham (KENT).—Development, Coney Hall Farm Estate by Morrell (Builders), Ltd.

Wigan.—Houses (104), Worsley Hall Estate; borough surveyor.

Wolverhampton.—R.C. Church, Cannock Road; E. Bower Norris, architect, Stafford.